Coal Age

A McGRAW-HILL PUBLICATION AUGUST, 1947

COAL CONTRACTS . . p. 74

Getting his bearings right

SUN MINE LUBRICANT...

Cuts Bearing Replacements 25% in Mine, Cuts Lubrication Costs 40%

The cars in a well-known Pennsylvania mine were being lubricated by a special high-priced oil, but results were not entirely satisfactory.

A Sun Engineer was called in and recommended a Sun Mine Car Bearing Grease that had proved itself in dozens of mines where conditions were similar.

With this new grease on the job far better lubrication was obtained. Bearing seat replacements were reduced 25% and lubrication costs went down 40%.

For every type of mine-machine from loaders on the deepest seam right up to your hoists and powerhouse equipment, there are "Job Proved" Sun lubricants that will help you to produce more for less. Get your bearings right . . . call your nearest Sun office, or write Department CA-8.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***
In Canada: Sun Oil Company, Ltd.—Toronto and Montreal

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INDUSTRIAL PRODUCTS

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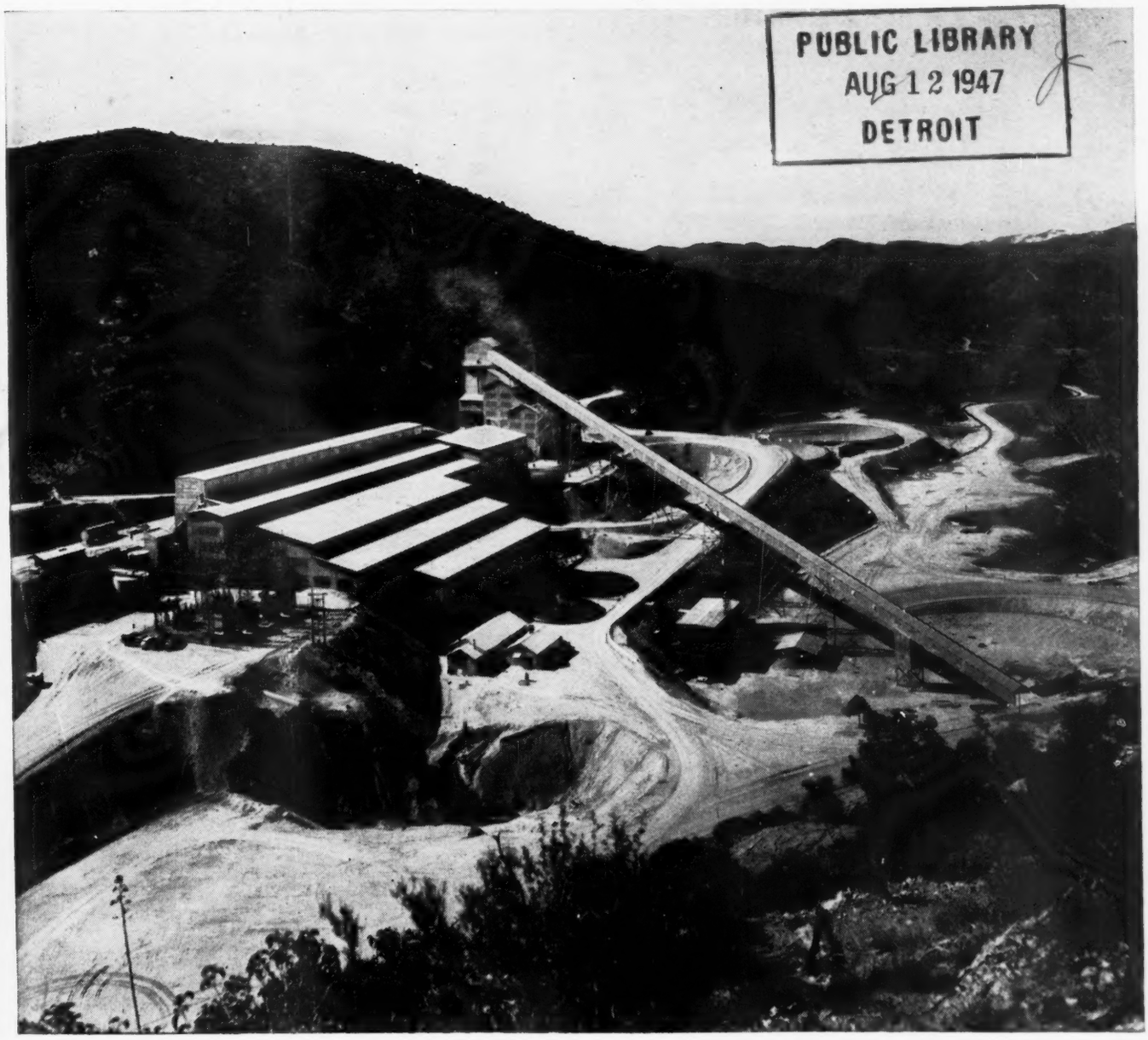


15 million tons climb a mountain—on rubber

A typical example of B. F. Goodrich product improvement

THAT long incline houses a rubber escalator that goes from 140 feet underground to a point half as high as the mountain. It has carried 15 million tons of jagged copper-bearing rock—and is still good for many millions more.

Lifting rock to a crusher plant has always been a problem. Conveyor belts were used but the constant flow of sharp rock cut and tore the rubber and stiff fabric, of which these belts were made. B. F. Goodrich engineers set out to develop a belt that would stand the punishment.

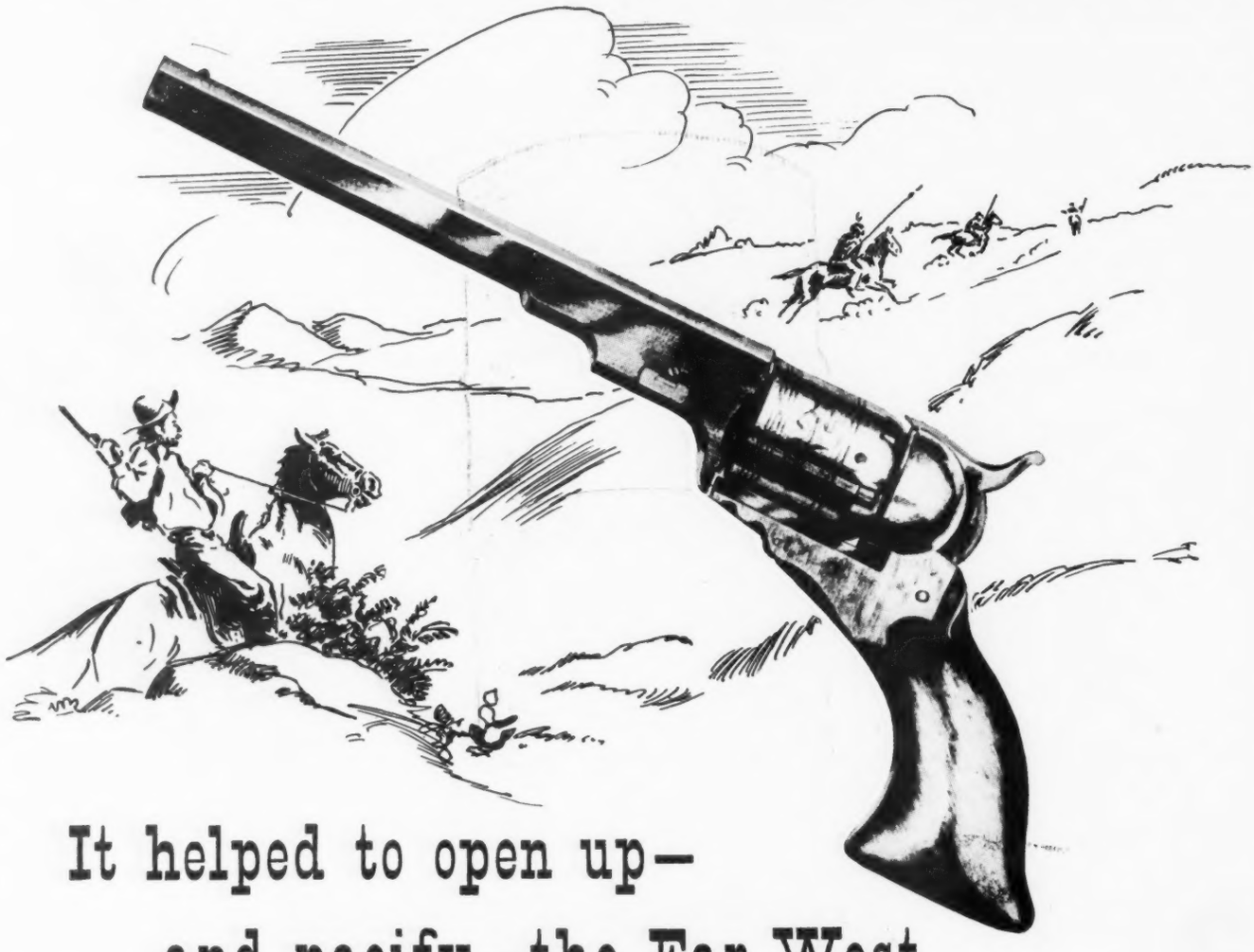
First they replaced the woven fabric of the usual conveyor belt with thousands of individual cords encased in rubber. When rocks hit this belt, the cords can spread and soak up the shock instead of stiffly standing—and wearing—as former belts did.

This new type of belt was put into service and soon was establishing new records of performance—5, even as much as 10 times the life of former belts. At the mine in the picture, the new B. F. Goodrich "cord belt" as it is called has already lifted 15 million tons and looks as good as new.

This is the sort of development that goes on constantly at B. F. Goodrich and that makes it good business to find out what improvements BFG has made lately in the rubber products you buy or could buy, to your advantage. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F.Goodrich
FIRST IN RUBBER

First in its Field....



It helped to open up— and pacify—the Far West

THE FIRST "SIX-SHOOTER"

One day in 1830, Sam Colt idly whittled a wood model of a pistol with a revolving barrel—and six years later in Paterson, New Jersey, the original Colt (shown above) was made by the Patent Arms Company. Celebrated in story and song, no single small weapon has had such a far-reaching effect on history as the "six-shooter"; and the deadly accuracy in its use developed by many famous characters is legendary.

Celebrated throughout the coal mining industry, no single product has had such a good effect on the operating and maintenance costs of coal mining machinery as HULBURT QUALITY GREASE. Especially today, when the full possibilities of its use are developed for coal operators by HULBURT Lubrication Engineers, who go right down into your mine and show you how to get the best results from HULBURT QUALITY GREASE.

HULBURT OIL & GREASE COMPANY—PHILADELPHIA, PENNA.

Specialists in Coal Mine Lubrication

...a record of

American Leadership

HULBURT *Quality* GREASE

THE "FIRST NAME" IN

with mining machine cable . . .

it pays to look "under the hood," too

Of course — the outside jacket of mining machine cables is of prime importance to long, trouble-free cable life. That's why we talk so much about the Hazaprene jacket — its flame resistance . . . sun, oil, water and acid resistance . . . the way it stands up so long in the toughest kind of service.

But what about the conductor insulation? With Hazacord you get the *extra* protection and service life provided by *Performite* heat resisting rubber insulation. This better grade insulation permits Hazacord to safely carry approximately 25% more current than cables made with ordinary Performance grade rubber insulation. Performite insulation has a temperature rating of 75°C. as against a 60°C. rating for Performance grade insulation.

And consider fillers in cable construction. Jute fillers can sometimes act like a wick — drawing trouble-making moisture into the cable interior. So when fillers are necessary, Hazard puts only Hazaprene fillers into Hazacord mining machine cables. Again it's *extra* assurance for you, that with Hazacord carrying the load you have reduced the chances of trouble from this part of your job to a minimum. Get all the facts from the Hazard Mining Catalog. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD

5260

insulated wires and cables for every mining use

Coal Age

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than any other kind

The largest selling bits for use with mechanical coal cutting machines are Bowdil Bits. Such popularity is deserved by performance, long life and low cost operation in a growing list of mines throughout the world.

Made of special alloy steel and heat treated by the most modern methods to hardnesses best suited to your cutting conditions, Bowdil Bits are available in special shapes, cutting face contours and clearance angles to fit your needs.

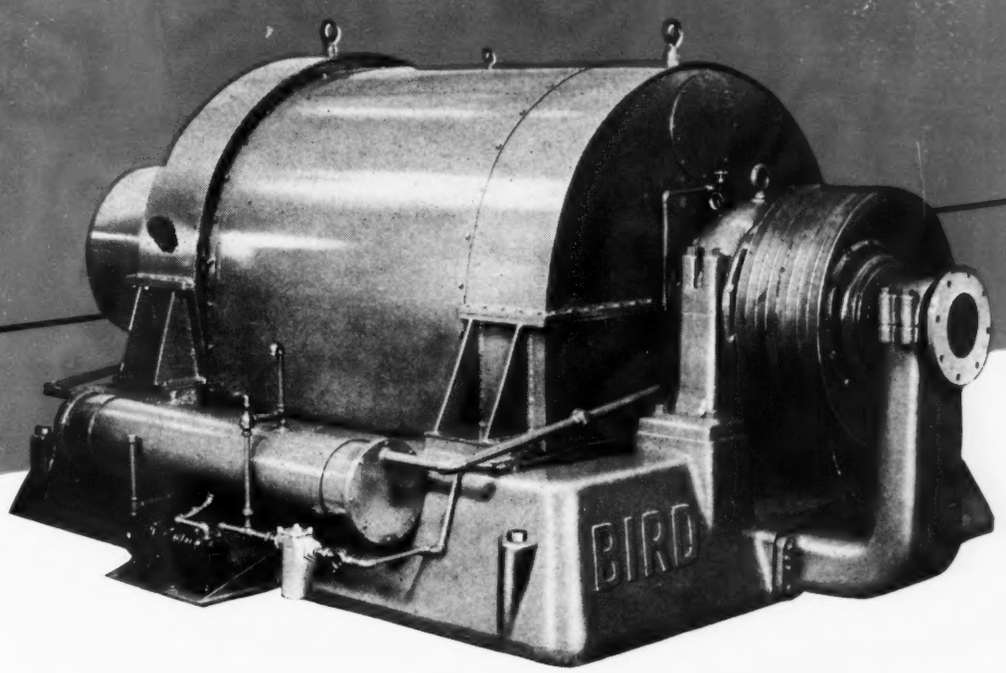
A nearby Bowdil Service Man or Representative will be pleased to give you further information. Write for our latest bulletins on Bowdil Mining products.

BOWDIL

COAL CUTTING EQUIPMENT

CANTON OHIO

THIS BIRD DOES FOR FINE COAL WHAT IT HAS BEEN DOING WITH OUTSTANDING SUCCESS FOR HUNDREDS OF OTHER PRODUCERS OF MINERALS AND CHEMICALS FOR THE PAST FIFTEEN YEARS



The Bird Continuous Centrifugal Filter removes the water from fine coal after washing.

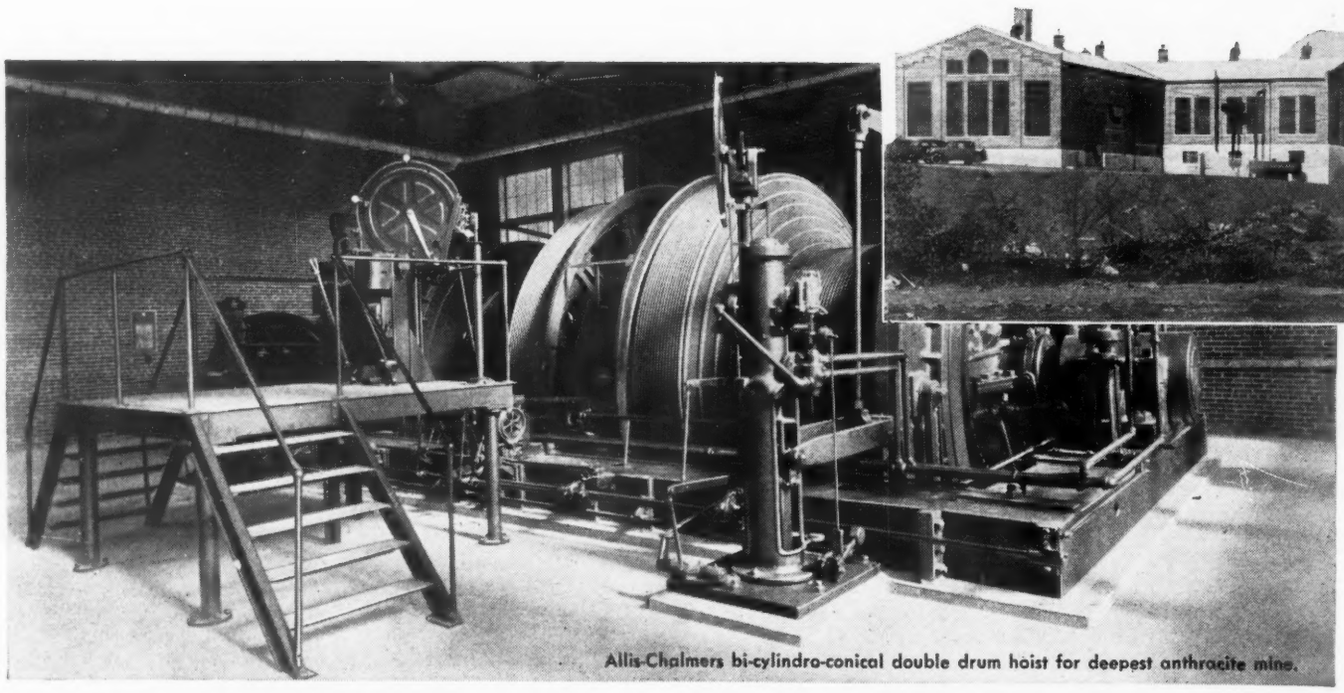
The water is *clean*—ready for immediate re-use . . . The coal is *dry*—ready for blending with the larger sizes.

Operating and maintenance costs are exceedingly low. The BIRD runs continuously over long periods without parts replacements.

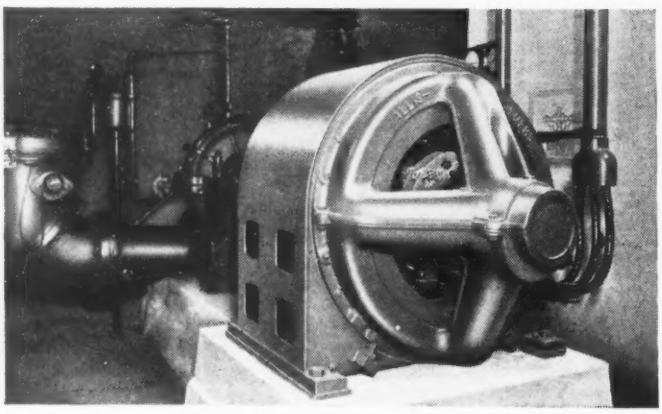
BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

Hoisting Costs

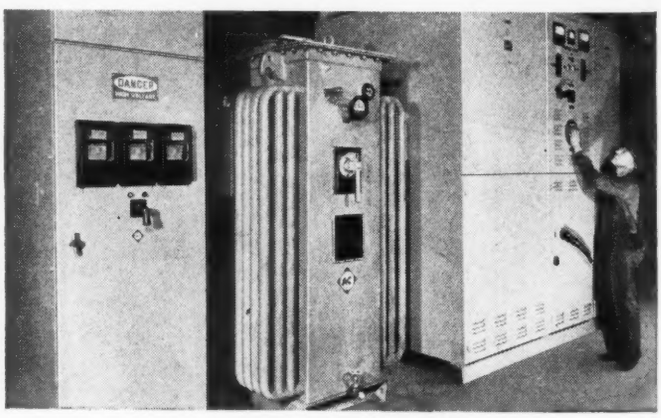


Allis-Chalmers bi-cylindro-conical double drum hoist for deepest anthracite mine.



POWER UTILIZATION

DEPENDABLE POWER for mine drainage is supplied by this 1,000 hp wound rotor induction motor which drives a 9,000 gpm; 360 ft head, single-stage pump in a large coal mine. Allis-Chalmers builds motors for *any* torque and hp requirements . . . with open, enclosed or splash-proof construction. Durability features, such as rigidly fabricated steel stator frame construction . . . statically and dynamically balanced rotors . . . liberally designed bearings and housings result in unusually long motor life.



POWER DISTRIBUTION

IT'S EASY TO INSTALL sealed tube type Excitron rectifiers. Each Excitron unit is completely factory assembled and wired for immediate connection to power supply. Excitron rectifiers have no major rotating parts . . . require minimum attention and maintenance . . . offer high overall power conversion efficiency for d-c voltage regulation over 250 volts. High power factor is almost constant under *all* load conditions. Simple, rugged Allis-Chalmers design means long tube life and thoroughly dependable service.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

Go Down ...JOB RECORDS SHOW

with Allis-Chalmers Electric Hoists and "Regulex" Control

THIS HOIST set a record for economical hoisting in the deepest U. S. anthracite mine . . . resulted in *new low kw per ton costs* for these conditions. Other *hundreds* of Allis-Chalmers hoists—in use throughout the world — prove the soundness of A-C engineering.

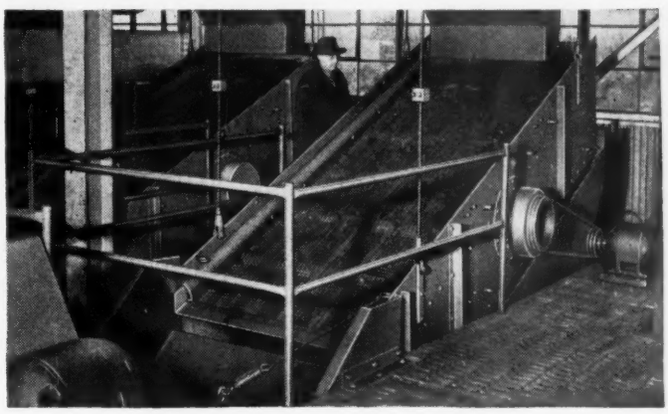
All Allis-Chalmers hoist designs are based on years of experience in working out *cost-lowering* solutions to hoisting problems. And hoisting is only one way in which Allis-Chalmers equipment engineering can help you get increased tonnage at lower cost.

Such products, for example, as the Solids-Handling Pump and the Low-Head Screen with End-Tensioned Deck for coal dewatering have been developed specifically for coal by Allis-Chalmers coal industry specialists.

Find out how Allis-Chalmers equipment can help *you* cut costs. Call the A-C office nearest you. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

CENTRIFUGAL PUMPS

SAVE THREE WAYS with the compact Electrifugal, the Allis-Chalmers pump that costs less to buy . . . to install . . . to operate! Unit shown above is used to recirculate water for coal dewatering in a coal preparation plant. Pump and motor are combined in one "package" . . . Electrifugal pump occupies one-third less space than comparable pumps, and can operate in *any* position. Splash-proof construction. Single or double stage. Sizes ¾ to 25 hp; capacities to 1,600 gpm; heads to 500 ft. **Bulletin B6018.**



BASIC PROCESSING

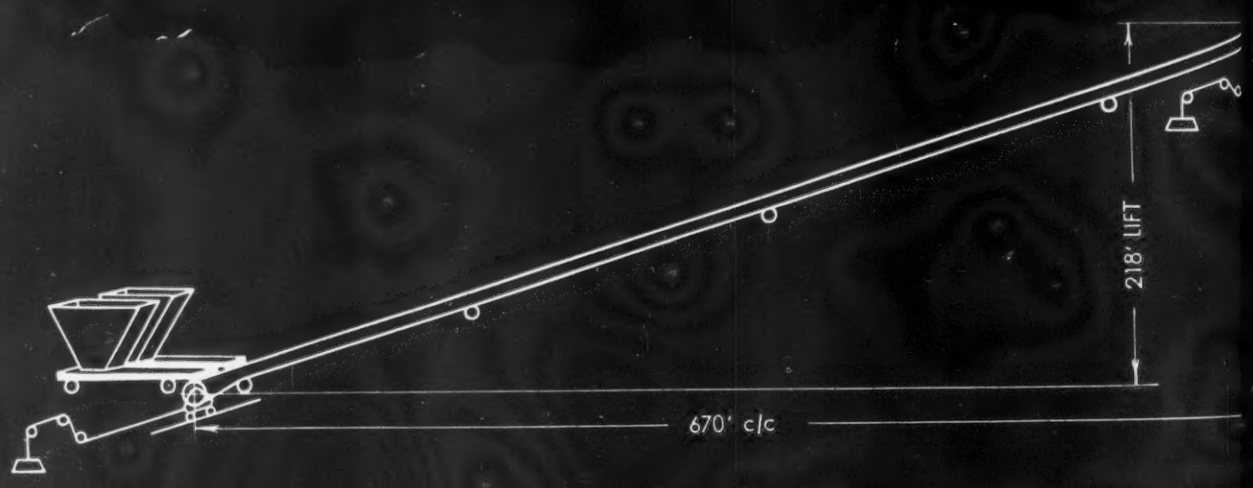
CIRCLE THROW action of Riplo-Flo screens results in rapid stratification and more even bed depth of coal on screen, increasing screening capacity. Two 5 by 12 ft Ripl-Flo screens, above, classify washed coal in a large coal tipple. Two-bearing mechanism eliminates outer bearings and support frames . . . makes Ripl-Flo light in weight and low in power requirements . . . greatly reduces vibration. Welded parts "stress-relieved" for uniform, lasting strength. Sizes 3 by 6 to 6 by 16 ft. **Bulletin B6151B.** A 2228

1847 1947 A CENTURY OF SERVICE to Industry THAT MADE America Great

...builds for COAL

Here's a Nine-Year Lesson in Slope Haulage

A 428-foot lift – 450 tons per hour – up a 32% incline!



THE long life, high-tonnage capacity and continuous, trouble-free performance of slope-entry conveyor belt haulage in all types of mining are dramatically illustrated by the Goodyear installation in the Lillybrook Coal Company's mine at Affinity, West Virginia. Yet when first considered, back in 1938, this operation seemed to present many difficulties.

The seam was 428 feet below surface! Engineering considerations required sinking the slope at a 32 per cent incline! An output of 450 tons per hour was demanded!

To meet these conditions the G.T.M. – Goodyear Technical Man – specified a two-flight conveyor installation – the lower conveyor operating on 670-foot centers, the upper on 735-foot centers. To insure ample tonnage capacity, with good nesting for lumps to prevent rollbacks, he specified Goodyear belts, 42 inches wide, running at 350 feet per minute.

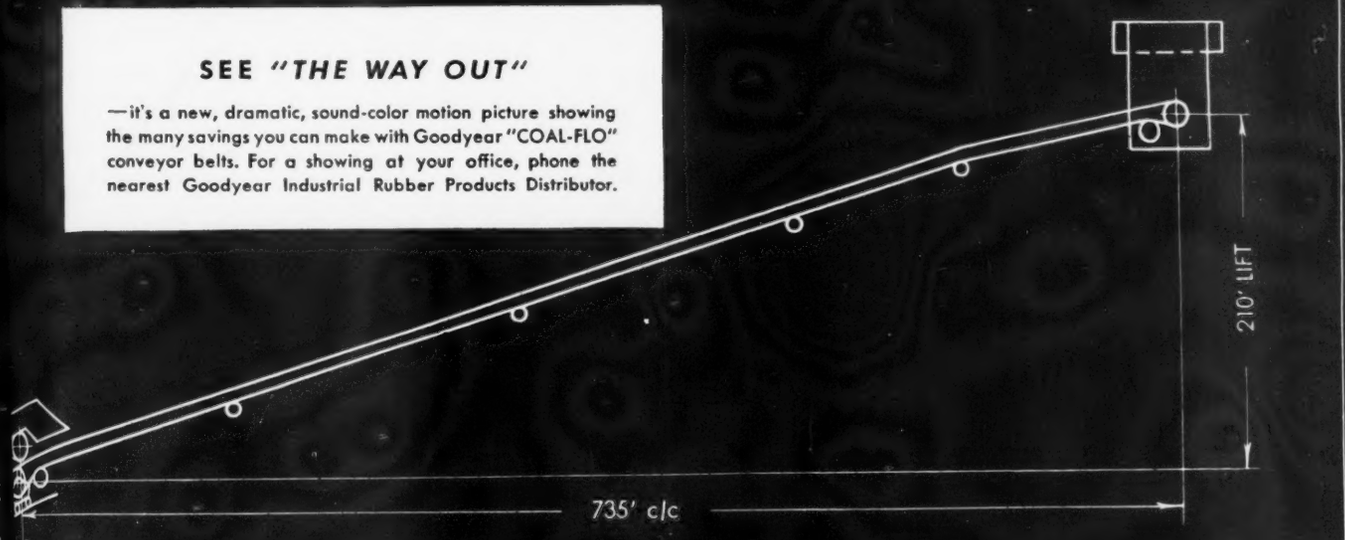
A 12,000,000-ton record

Now here's the pay-off. Today after nine years' operation, this veteran – *the longest and steepest installation in this field* – is still performing faultlessly, is still in A-1 condition. And it has delivered the required 450 tons at the tipple every working hour; a total of more than 12,000,000 tons!

If you want lowest-cost-per-ton haulage – reduced power costs – greater output – increased safety for personnel – investigate the many advantages

SEE *"THE WAY OUT"*

—it's a new, dramatic, sound-color motion picture showing the many savings you can make with Goodyear "COAL-FLO" conveyor belts. For a showing at your office, phone the nearest Goodyear Industrial Rubber Products Distributor.



GOODYEAR INDUSTRIAL RUBBER PRODUCTS

G-T-M-Specified

"COAL-FLO" BELT CONVEYOR SYSTEM

for Lillybrook Coal Company

of Goodyear "COAL-FLO" belts, both for slope haulage and underground. Proof of their superiority and longer life is the fact that "*more tons are hauled on Goodyear conveyor belts than on any other kind!*"

To bring the G.T.M. to your office for a complete analysis of your operation with dollar-and-cents' proof of savings, write: Goodyear, Akron 16, Ohio or Los Angeles 54, California.

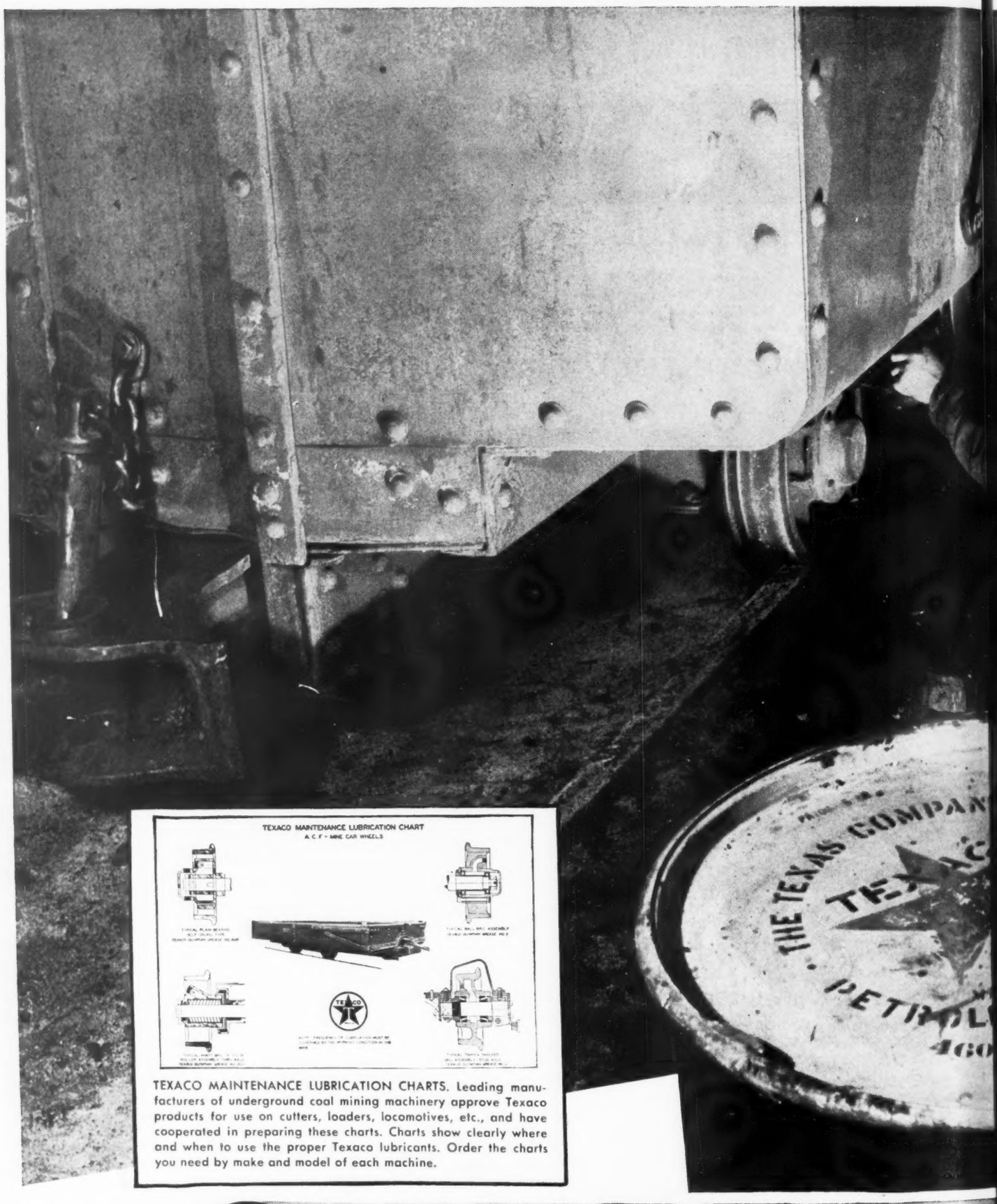
* * *

FOR HOSE, BELTING, MOLDED GOODS, PACKING, TANK LINING built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.

"COAL-FLO"—T.M. The Goodyear Tire & Rubber Company

GOODYEAR

THE GREATEST NAME IN RUBBER



TEXACO MAINTENANCE LUBRICATION CHARTS. Leading manufacturers of underground coal mining machinery approve Texaco products for use on cutters, loaders, locomotives, etc., and have cooperated in preparing these charts. Charts show clearly where and when to use the proper Texaco lubricants. Order the charts you need by make and model of each machine.

Tune in . . .
TEXACO STAR THEATRE
presents the
TONY MARTIN SHOW
every Sunday night.
See newspaper for
time and station.

TEXACO
REG. T.M.

TEXACO LUBRICANTS

AN EASIER START TOWARD

GREATER TONNAGE

Use *Texaco Olympian Grease* to lubricate wheel bearings — plain, cavity hub or anti-friction — and your trains will start and roll more easily, move greater tonnage from face to tipple on every shift.

Texaco Olympian Grease is made in three consistencies — all very easy to apply. It has exceptional resistance to separation and leakage, and is not affected by moisture in service. It prolongs bearing life, and assures fewer tie-ups of cars for repairs and servicing.

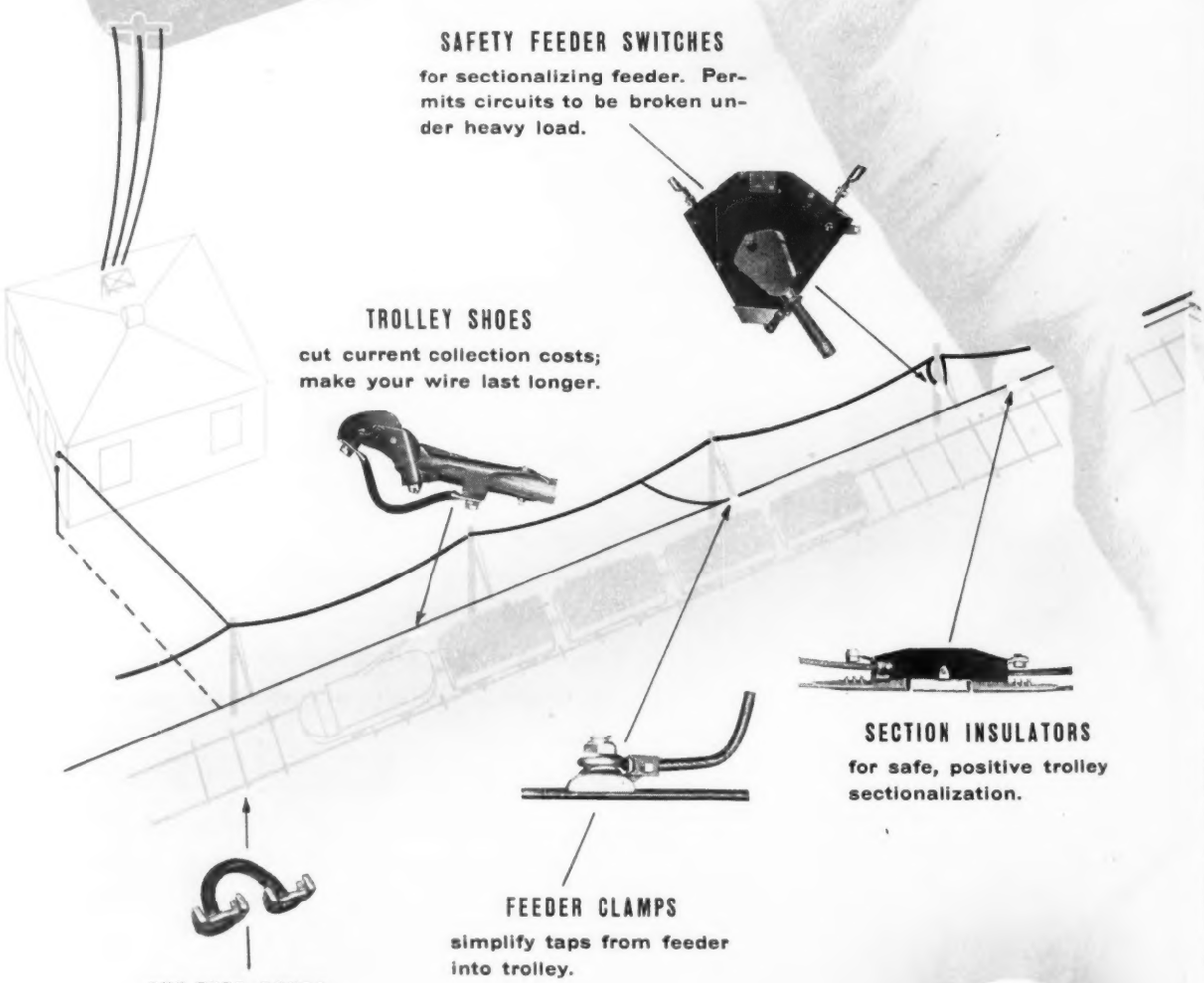
You'll find that *Olympian Grease* gives equally effective protection to bearings of cutters, loaders and similar equipment.

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2500 Texaco distributing plants in the 48 States, or write The Texas Company, *National Sales Division, Dept. C,* 135 East 42nd Street, New York 17, New York.

For the Coal Mining Industry

Complete From Substation to Face. An O-B Power Handling System

To put controlled power where and when you need it, install O-B Power Handling Materials from substation to face. A number of such devices are shown here. Why not check each one carefully to determine how many can help solve your power distribution problems.



SAFETY FEEDER SWITCHES
for sectionalizing feeder. Permits circuits to be broken under heavy load.

TROLLEY SHOES
cut current collection costs; make your wire last longer.

SECTION INSULATORS
for safe, positive trolley sectionalization.

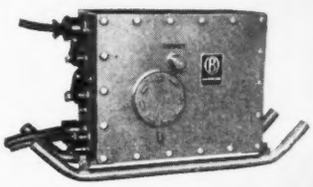
FEEDER CLAMPS
simplify taps from feeder into trolley.

"U"-TYPE BONDS
for operators preferring welded bonds on mainline track.

MOVE MORE COAL FOR LESS MONEY

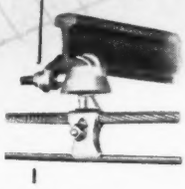
FUSED TROLLEY TAPS
protect cables from burnout.

MOTOR STARTERS
control and protect conveyor drives.



GROUND CLAMPS
grip rail edge or bond cable in a tight, vibration-proof ground connection.

EXPANSION BOLTS, HANGERS AND TROLLEY CLAMPS
to meet any trolley support problem above or below ground.



DUAL SUSPENSION CLAMPS
support both feeder and trolley from one hanger.

FROGS
for safe, sure trolley wire turnouts.

WEDGE BONDS
save time and money; are adaptable for all types of bonding.

DISTRIBUTION BOXES
act as portable switch panels for face set-ups.

Ohio Brass

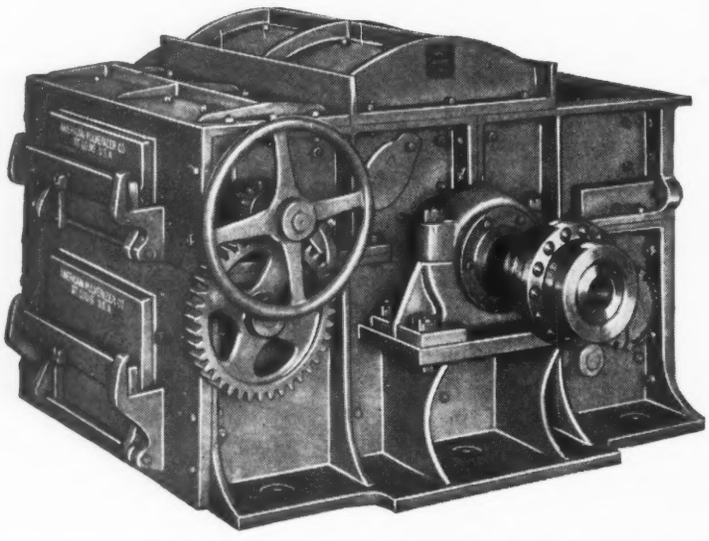
MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ontario

2790-M

WITH O-B MINE-TESTED MATERIALS

PREPARE YOUR COAL FOR MORE PROFITABLE MARKETING



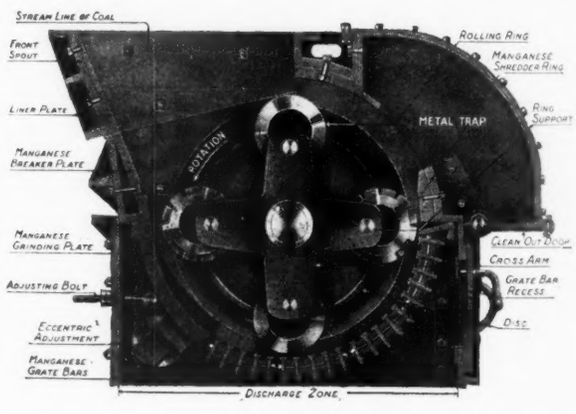
AMERICAN ROLLING RING CRUSHERS

produce high tonnage with minimum fines and no oversize.

Easily marketable stoker and pulverizer sizes are profitably produced in American Rolling Ring Crushers. Through the splitting action of the patented shredder rings revolving at slower speeds, instead of the conventional crushing action at high speeds, sizing is held uniform in high tonnage production with a minimum of undesirable fines. Americans are doubly adjustable for great flexibility of sizing to meet seasonable requirements and market conditions. Americans are available in types to fit your operation . . . capacities from 50 to 500 TPH.

The American "AC" Type Rolling Ring Crusher is made in a simple and compact design with heavily ribbed cast side frames. Joints are machined for dust-tight fit. The sectional design makes for easy dismantling or inspection of the crushing chamber.

The twenty cutting edges on each of the manganese steel shredder rings and the many rings on the heavy rotor assembly above give high tonnage output at slow power-saving speeds with minimum fines. The cross section view at right shows how the shredder rings, revolving on individual shafts are free to deflect from tramp iron to give uninterrupted production and protect the crusher from injury. The easily cleaned metal trap catches and holds tramp iron.



Send for "AC" Bulletin on coal crushing data and crusher specifications.

American PULVERIZER COMPANY

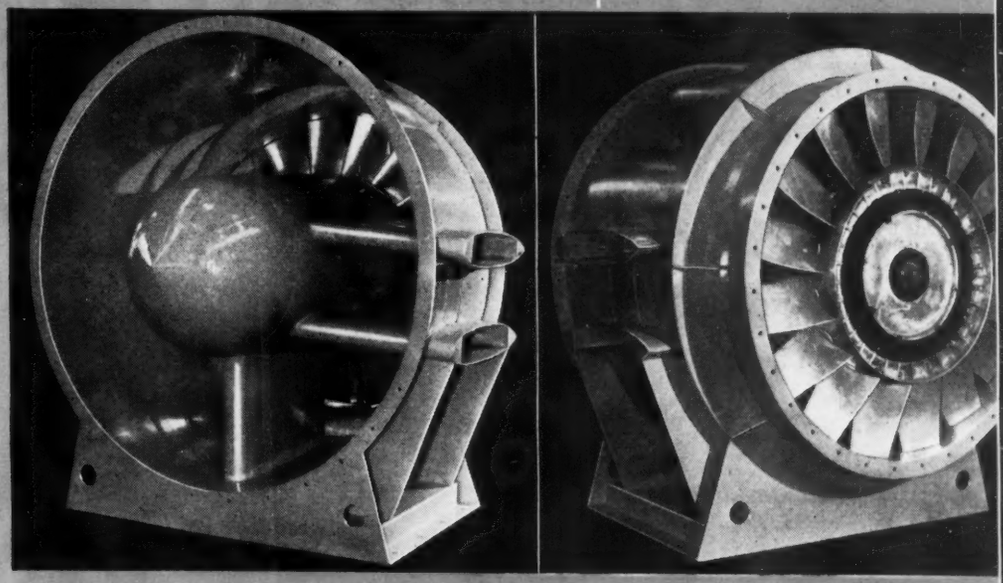
Originators and Manufacturers of Ring Crushers and Pulverizers

1119 MACKLIND AVE.
ST. LOUIS 10, MO.

FRESH AIR ASSURES SAFETY!

Consult a Joy Engineer about the use of

LA-DEL TROLLER DESIGNED AXIVANE* FANS



Quiet... Efficient... Adjustable Propeller Blades

The interlocked blades on La-Del Axivane* Fans adjust in unison through a single control to prevent error and eliminate guesswork when changing angles. An unusually wide range of blade angles permits operation at maximum efficiency at various rotor speeds. This exclusive La-Del feature eliminates the usual necessity of rotor replacement when the mine resistance exceeds the anticipated value.

Axivane* Fans are equipped with a sturdy steel base and factory installed rotor which simplifies and lowers the cost of installation. Lower rotor operating speeds that reduce noise, increase bearing life and simplify bearing lubrication problems, are common to all La-Del Axivane* Fans.

Write today for further information and detailed bulletin on La-Del Axivane* Fans.

Specify La-Del Axivane* Fans and you are certain to have 1947 design features!

Trade Mark Reg. U. S. Patent Office

WAD C

LA-DEL Division

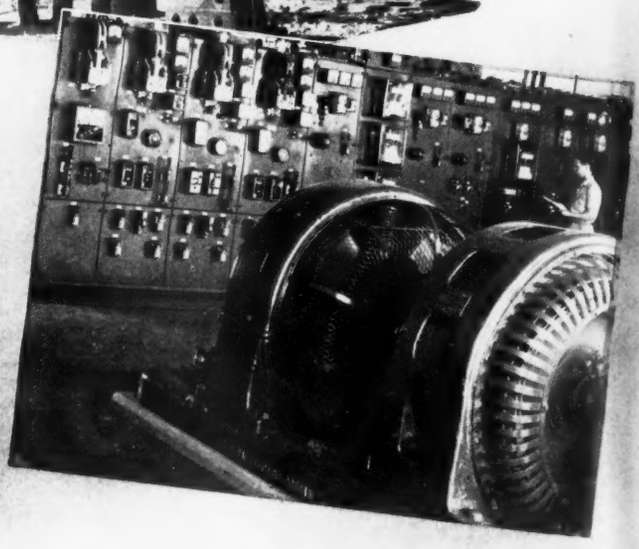
JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH, PA.

Here's the *Safe* way to

STRONGER BORE HOLE CABLE supports its own weight in drops of hundreds of feet to the working level.

BETTER INSULATION that withstands mine moisture, does not suffer from mildew and age, gives greater protection to workmen.



IMPROVED POWER PLANT CABLE AND WIRE withstand higher temperatures, carry heavier loads.

electrify your mine...

choose U·S·S American

SAFETY in electrical wire and cable is a matter of sound engineering. Before any American Steel and Wire Cable is approved for mining service, it goes through a long period of engineering research and testing. Materials must be proved good enough to withstand mine acids, abrasion from sharp rock, the effect of oil, grease, also of severe abuse and flame.

That's why it is just as important to choose a reliable manufacturer as it is to choose the right type of cable.

Recent developments in U·S·S American Cable include a two-conductor mining machine cable with a flat ground strand. This assures positive grounding of rubber tired machines and protects workmen from any possibility of electrical shock.

Three-conductor shovel cables are built with three ground strands between the conductors. If any workman should penetrate the cable with a sharp, hard tool, the ground wires would conduct the current harmlessly away.

Better Neoprene covers resist abrasion, oil, grease and moisture adding further protection to workmen who handle electrical cable.

New types of insulation that do not rot away with age offer much better protection to electrical maintenance men.

These are just a few of the ways in which the superior engineering of U·S·S American Cables is making mines safer for the workers.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

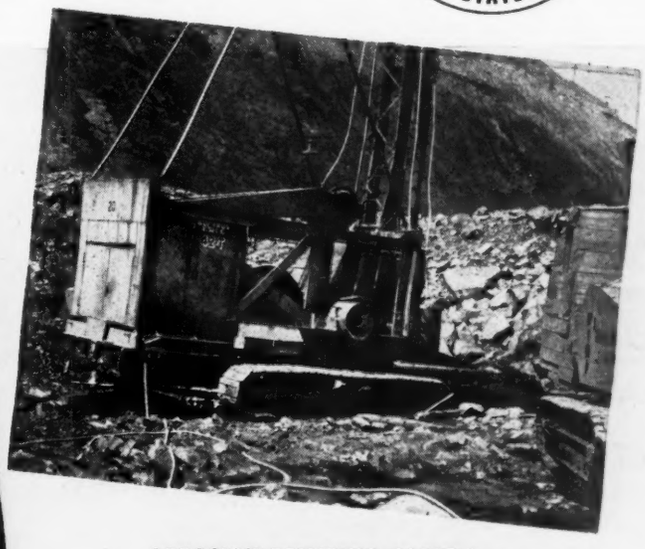
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*

United States Steel Export Company, New York

UNITED STATES STEEL

AMERICAN STEEL & WIRE COMPANY ★ USS ★ AMERICAN ELECTRICAL WIRE AND CABLE ★ UNITED STATES STEEL



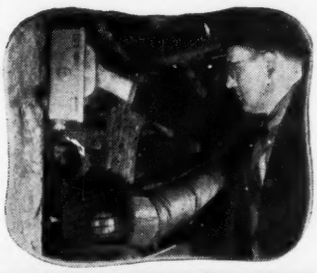
BETTER CABLE COVERINGS made of Neoprene resist constant flexing, abrasion, oil, grease and moisture.

ABRASION-RESISTING CABLE for drilling machines and shovels can be dragged over sharp rocks without danger.

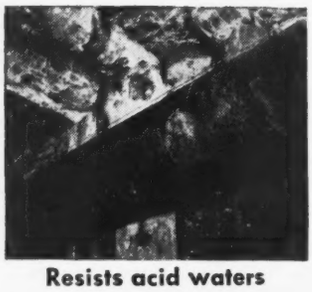
U·S·S AMERICAN Electrical Wire and Cable

WHY YOU CAN'T BEAT "VENTUBE"

for low-cost auxiliary ventilation



Not harmed by fungus



Resists acid waters

Easy to couple

Easy to hang up

"HESSIAN CLOTH"
Jute fabric has warp and filler of equal strength for maximum resistance to tearing and ripping due to blast concussion. Treated for protection from fungous growths.
SUSPENSION HOOK
is the standard, developed by Du Pont and licensed to all makers. Distributes weight along seam at regular intervals to prevent tearing. Special seam gives interlocking of fabric for strength. Machine-stitched for air-tight joint; with treated thread.
NEOPRENE COATING
Neoprene is a tough, durable synthetic rubber that gives long life—resists acid mine waters, doesn't oxidize from old age. Coating is heaviest on outside for abrasion resistance.
EASY COUPLING
with special, round-flanged ring to prevent shearing of fabric and triple strength in the ring itself. Metal is resistant to corrosion.

How "Ventube"* cuts costs and speeds your output . . .

1. Helps miners do a good day's work. Good velocity of fresh air for cooling power. A little more air velocity often makes possible a lot more physical effort. Often lowers humidity and temperature at working face.

2. Helps management plan fast, steady production. Clears face quickly after blast for intermittent blasting and uninterrupted cycle of mucking, drilling, blasting. Keeps men alert to pull down accident rate.

3. Keeps up with work. Follows the most tortuous working. Avoids need for many costly special fittings on curves. Takes up less room in openings. Easily directed to heading

4. Saves man-hours. Costs one-third as much to install as rigid-type ventilation. One man can carry 100 feet of tubing and install complete in one hour. Easy to move. Folds to fit in small space between jobs.

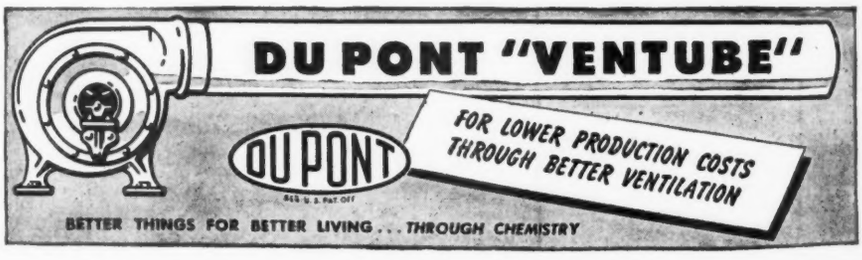
5. Saves power. Costs 1/10 as much as compressed air for each 1,000 cu. ft. of air released at working face. Low initial cost permits larger tubing and lower friction losses. Long lengths permit fewer joints. Patented coupling makes airtight connection quickly.

6. Saves damage. Collapsed and retracted easily to avoid damage from blast. Pushed aside or removed easily to bring large equipment up to face. Coated with neoprene synthetic rubber for better resistance to acid mine water and fungous growths. No deformation of tubing ends.

WRITE FOR "VENTUBE" BOOKLET

Tells how to increase mining efficiency with "Ventube" attached to blower fan. E. I. du Pont de Nemours & Co. (Inc.), Fabrics Division, Fairfield, Conn.

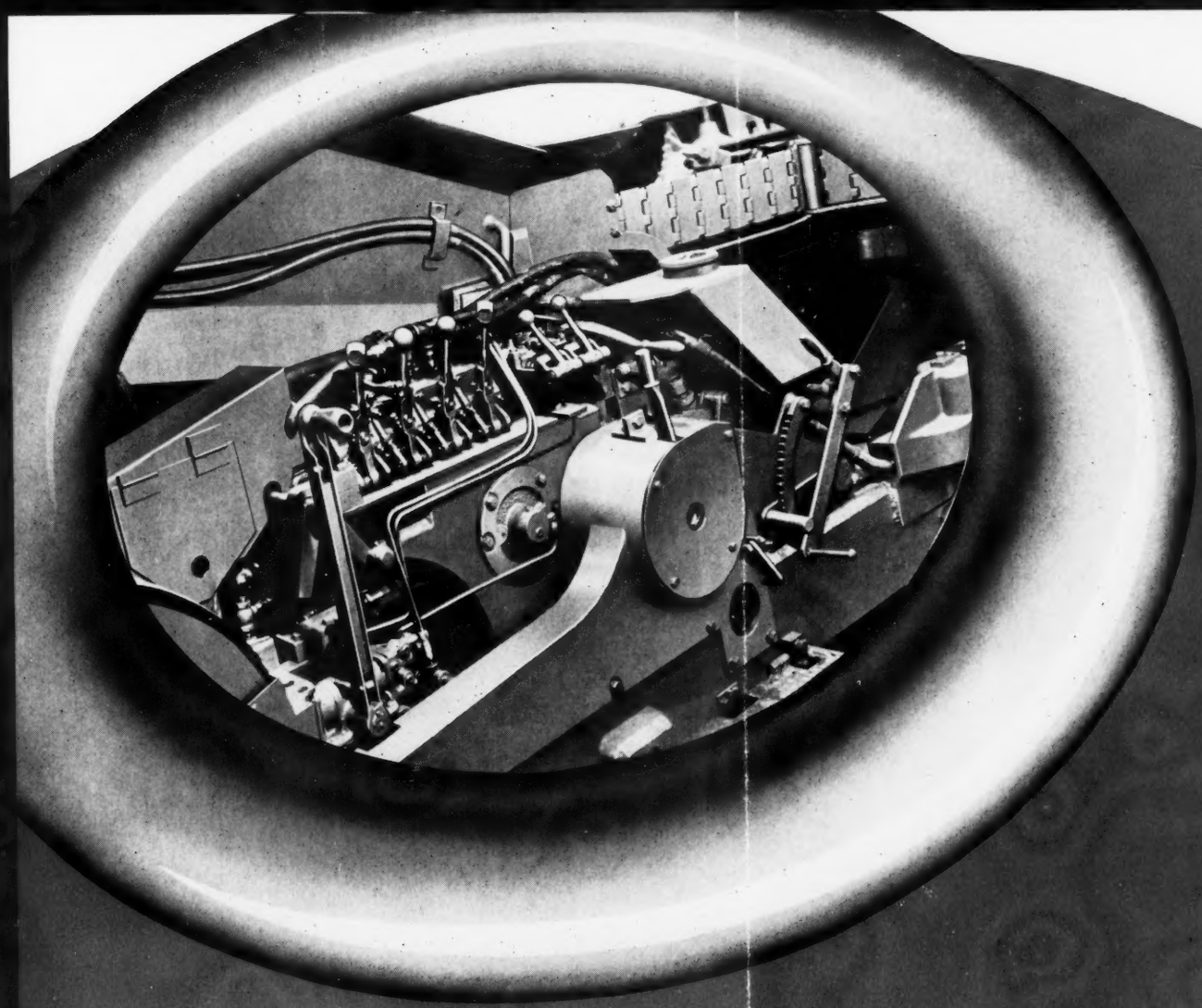
*"VENTUBE" is Du Pont's registered trade mark for its flexible, synthetic-rubberized ventilating duct.


DU PONT "VENTUBE"
DUPONT
REG. U.S. PAT. OFF.
FOR LOWER PRODUCTION COSTS THROUGH BETTER VENTILATION
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

6.23-44

● And now a Jeffrey L-600 Loading Machine in operation. Full hydraulic control of gathering head and conveyor centralized at operator's station permit loading maximum tonnage per shift. Let us tell you more about Jeffrey loading machines and what they can do for you.
JM

JE



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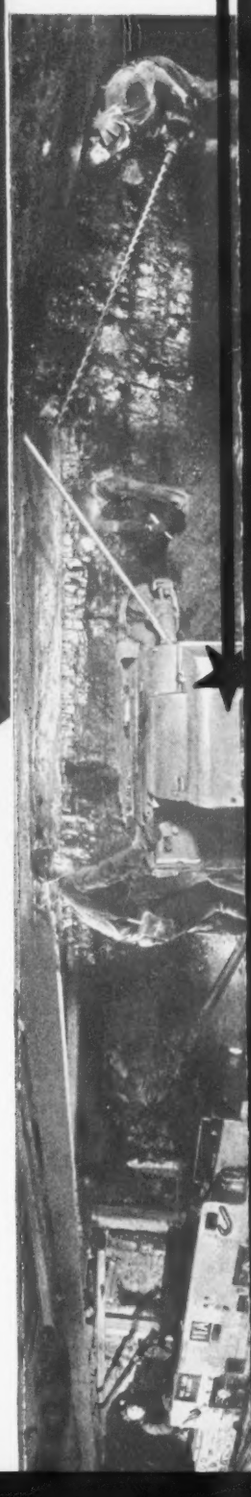
Jeffrey ser

CUTTERS



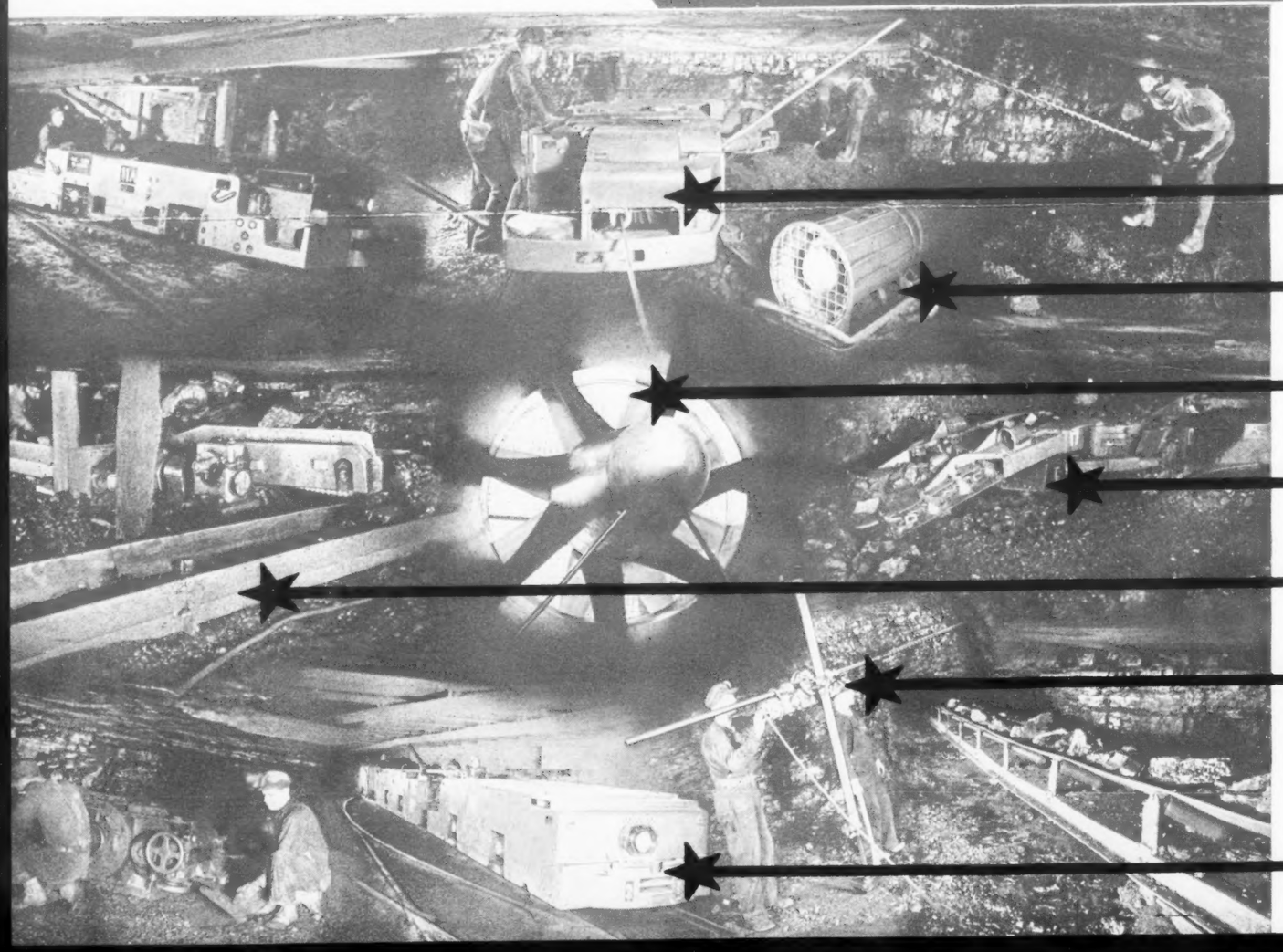
A Sturdy Link

IN MODERN COAL PRODUCTION

JEFFREY L-600 LOADER

● It's the rigidity and sturdy construction throughout that keeps Jeffrey Loaders on the job day after day with a minimum of maintenance. They form an important link in coal production and provide economical mechanized loading for all conditions. Capacity is there when needed. Jeffrey Loaders are flexible—have fingertip hydraulic control and automatic cable reel to speed movement.

The L-600 Loader offers high capacity loading to all mines with seams ranging from three and one-half feet upward. Ideally suited to room and pillar mining in panels, block system or in other methods of pillar recovery. Jeffrey also builds loaders particularly adapted to low seam operations.



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DADER

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s, block system
pillar recovery.
aders particu-
eam operations.

JEFFREY EQUIPMENT FOR COAL MINES

Jeffrey service to Coal Mines means service to all industry

- CUTTERS
- BLOWERS
- FANS
- LOADERS
- CONVEYORS
- DRILLS AND DRILLING MACHINES
- LOCOMOTIVES

THE JEFFREY MANUFACTURING COMPANY

ESTABLISHED IN 1877

912-99 NORTH FOURTH STREET, COLUMBUS 16, OHIO

SALES OFFICES:

Baltimore, Birmingham, Boston, Buffalo, Chicago, Cleveland, Cincinnati, Detroit, Denver, Harlan, Houston, Huntington, Milwaukee, New York, Philadelphia, Pittsburgh, Scranton, St. Louis, Salt Lake City

SERVICE STATIONS:

Pittsburgh, Harlan, Ky., Birmingham, St. Louis, Logan-Beckley, W. Va., Scranton

FOREIGN PLANTS:

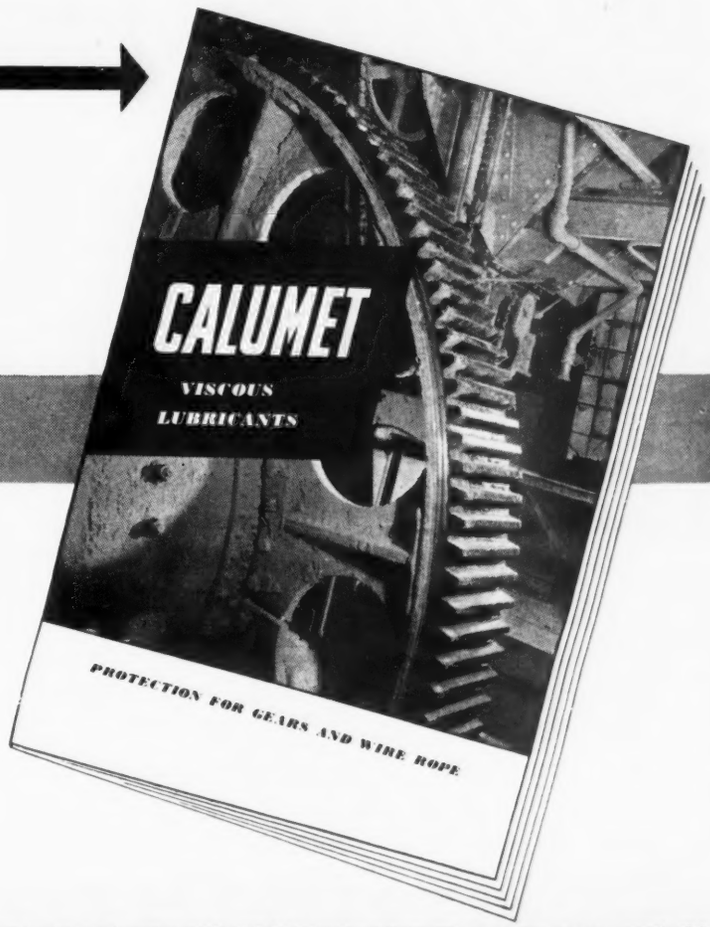
Jeffrey Mfg. Company, Ltd., Montreal, Quebec

British Jeffrey-Diamond, Ltd., Wakefield, England

Jeffrey-Galion (Pty), Ltd., Johannesburg, S. A.

Why Calumet Viscous Lubricants reduce wear on gears ....why they add life to wire rope .... why they adhere to metal and resist removal by heat or water ... these are some of the subjects fully discussed in this booklet →

It may lead you to worthwhile savings.



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Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, or ask the Standard Oil Representative who calls on you for a copy.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

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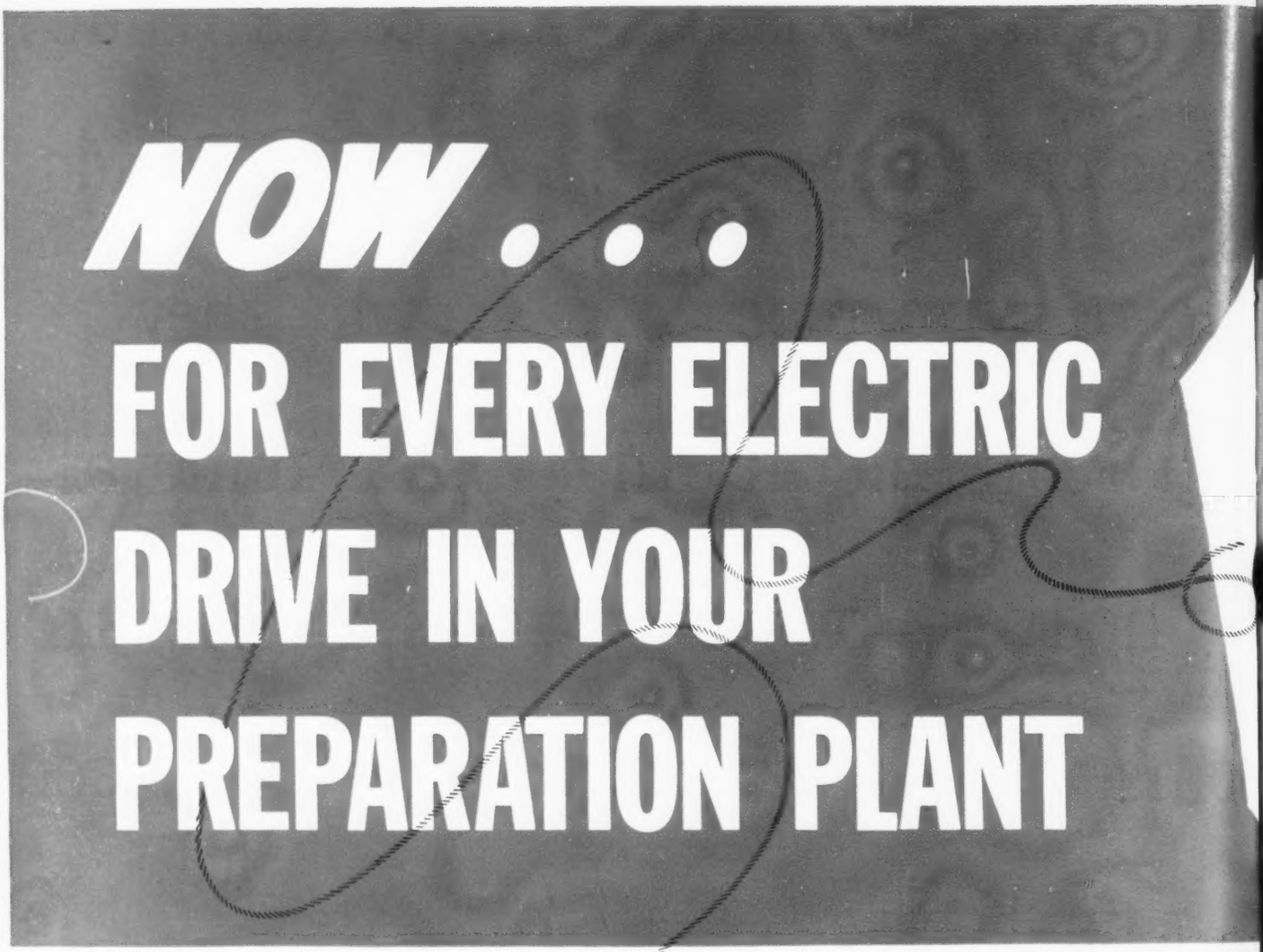


TRI CLAD
EXTRA PROTECTION

In 1940, the first Tri-Clad* motor made big news in the coal industry. More horsepower-per-frame-size, trim, compact appearance—these were important features. But it was the extra protection we built into the rugged Tri-Clad motor design that really sold more than 1,220,000 Tri-Clad motors.

Today, Tri-Clad is a "family" name. Tri-Clad protection is available in almost every type of motor a coal preparation plant might use—open (dripproof) motors, totally enclosed motors, wound-rotor motors, gear-motors, vertical motors. This means you can now gain the advantages of Tri-Clad extra protection on *all* of your important drives.

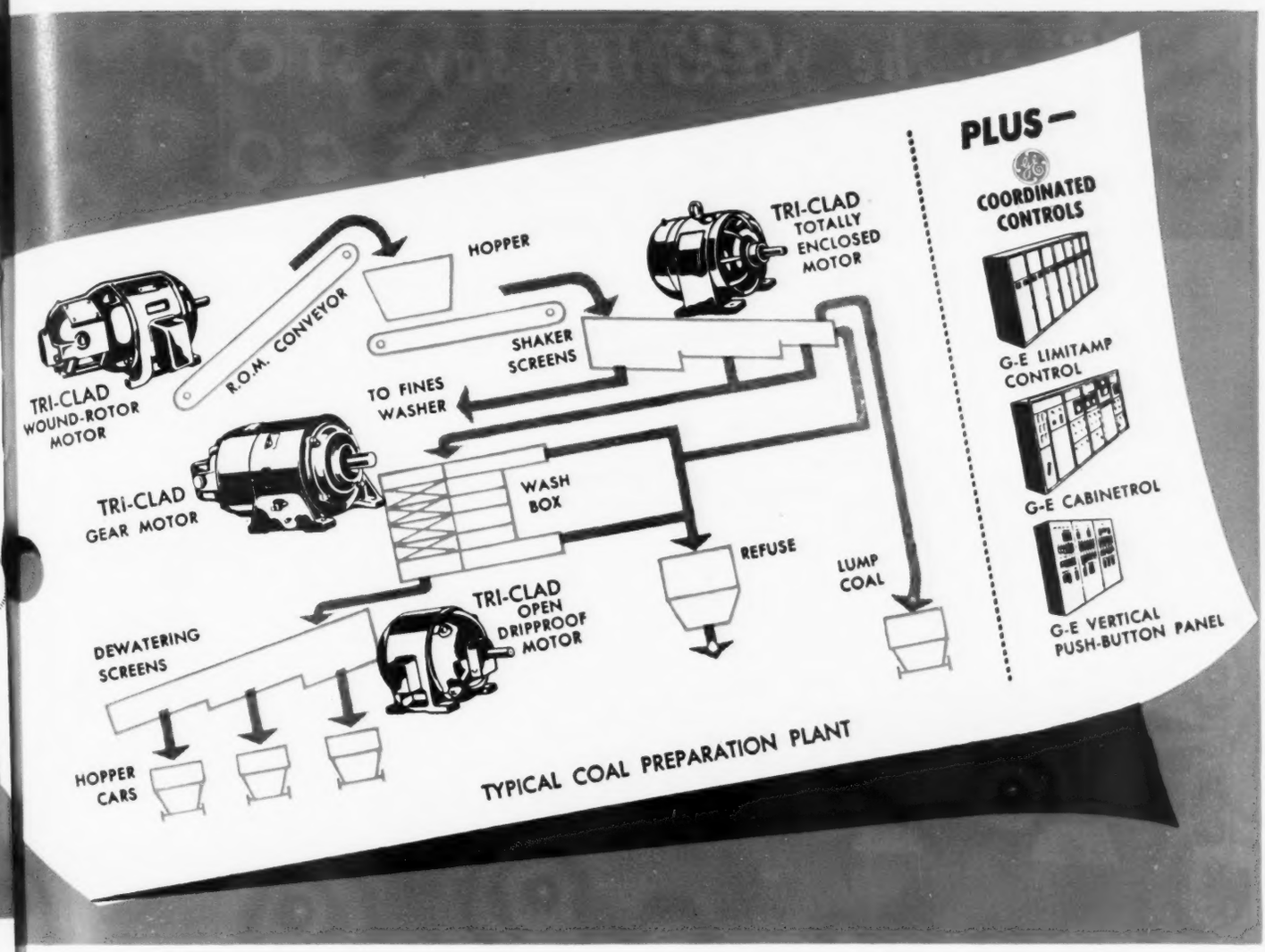
Reg. U. S. Pat. Off.

EXTRA PROTECTION . . . AGAINST PHYSICAL DAMAGE!

A rigid cast-iron frame and end shields to protect vital motor parts from external abuse. Strong resistance of cast iron to corrosion. Tight, metal-to-metal fits between end shields and frame.

EXTRA PROTECTION . . . AGAINST ELECTRICAL BREAKDOWN!

Motor windings of Formex* wire, together with improved insulating materials, to reduce the chances of electrical failure. Large, free-flowing air passages to dissipate heat quickly.



EXTRA PROTECTION . . . AGAINST OPERATING WEAR AND TEAR! Improved bearing design to retain lubricant, keep out dirt. Long, close-running fits to keep foreign matter from entering motor along shaft.

NOW . . . AN EVEN TOUGHER TRI-CLAD! Newest addition to the Tri-Clad motor family is the Tri-Clad totally enclosed, fan-cooled motor. It meets the Federal Code requirements for dust-tight tipple motors, with these extra protection features:

- *A cast-iron, double-wall frame which completely encloses and protects the windings and punchings*
- *A non-shrinking compound around motor leads which protects motor interior from dust and moisture*
- *A rotating labyrinth seal which further protects the motor interior from damage by foreign matter*

Make it an "ALL G-E"

CO-ORDINATED ELECTRIC DRIVE!

Preparation plant operators who specify General Electric co-ordinated electric drives avoid the endless details involved in ordering and securing delivery of all the many components in a modern electric drive. And they know they're getting a soundly engineered system to meet a specific set of conditions.

A co-ordinated General Electric "package" drive includes G-E "packaged" unit substations, G-E Cabinetrol for low-voltage motor control, G-E Limitamp for high-voltage motor control, Tri-Clad motors for drives where protection is important, G-E cable, and G-E push-button installations for centralized control. Why not call in a General Electric coal mining specialist to discuss your electric drive problems soon? *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

Motors and Controls
FOR THE
COAL MINING INDUSTRY

GENERAL ELECTRIC

When the WEATHER says STOP . . . WALTER SAYS GO

Walter 100% Traction keeps huge loads moving in bad weather and running conditions

YOUR open pit mine operations are not at the mercy of the weather, when you haul with Walter Tractor Trucks. As long as shovels can dig, these giant trucks can haul . . . through mud, soft and slippery surfaces, up steep grades. That means extra days of production that are now lost by the inability of conventional trucks to work under such conditions.

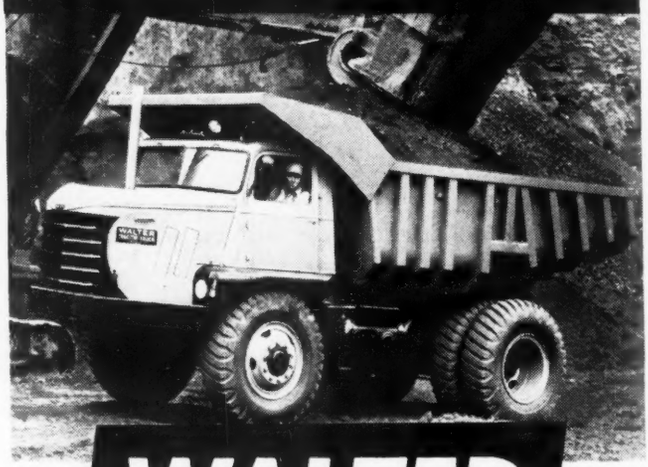
This all-weather, all-surface, all-season hauling ability of Walter Tractor Trucks comes from the unfailing, non-slipping traction of the Walter 4-Point Positive Drive . . . with three automatic locking differentials that insure 100% traction in all driving conditions.

Learn more about this exclusive advantage of Walter Tractor Trucks, as well as features such as suspended double reduction drive, tractor type transmission, engine-ahead-of-wheels for short wheelbase and correct weight distribution, power hydraulic steering, air brakes and other engineering advances.

Write today for detailed literature. The nearest Walter distributor is glad to discuss your needs.

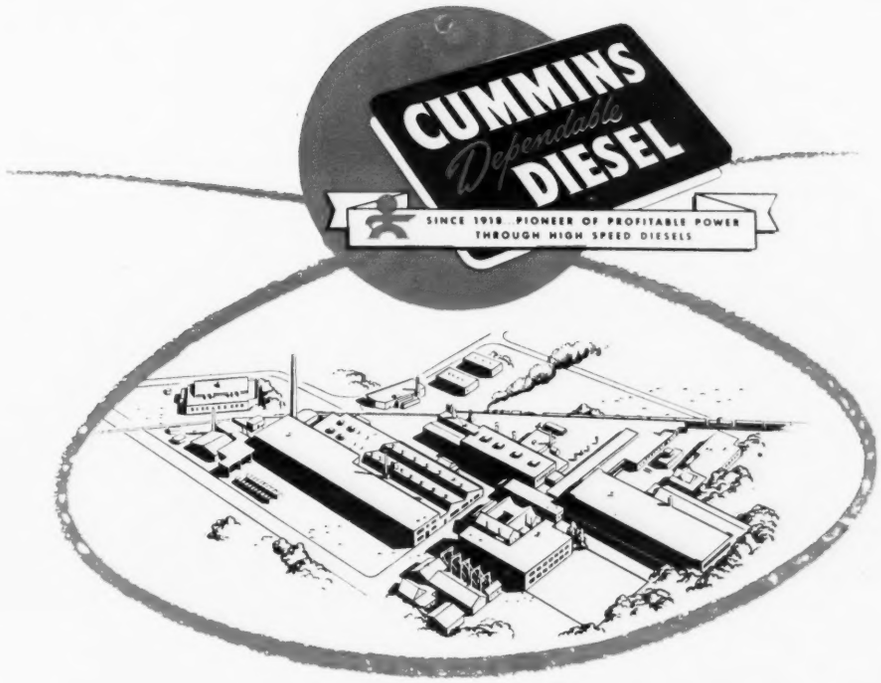
- 30-TON PAYLOAD hauled by Walter Tractor Truck, in single bottom dump trailer. 60 tons can be hauled, by two trailer units.

- 20-TON DUMPER provides ideal unit for coal hauling or mine waste disposal. Compact, rugged, powerful.



WALTER TRACTOR TRUCKS

WALTER MOTOR TRUCK CO. 1001-19 Irving Ave., Ridgewood, 27, Queens, L.I., N.Y.



THIS FACTORY IS TOO SMALL

To Completely Satisfy Present Unprecedented User Demand

EVEN THOUGH . . . since the end of the war . . . Cummins have:

- spent three million dollars ($3,000,000) expanding their plant;
- increased floor space forty-four and eight-tenths per cent (44.8%).

BUT . . . this factory IS large enough:

- to build most of the Diesel Engines for the tough "premium" jobs;
- to assure users that Cummins quality and dependability will not be sacrificed to gain production volume.

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

UNITED STATES RUBBER COMPANY

Announcing an Amazing

NEW CONVEYOR

2½ TO 4 TIMES STRONGER!

By combining two famous textiles—Ustex* and nylon—scientists of the United States Rubber Company have created a new conveyor belt with these exceptional characteristics:

★ 2½ to 4 times stronger than the strongest duck-and-rubber conveyor belt ever produced—made possible with the world's strongest cotton yarn—Ustex—another U. S. Rubber development—

★ Greater troughability—due to the use of flexible nylon—

★ Possible to repair quickly in case of accident—with the same techniques already known to maintenance men—

★ Economical to operate—due to longer centers—fewer transfer points—

★ Less than one-half the weight of a conventional duck-and-rubber belt of equivalent strength.

This new "U. S." Belt was designed for extra-big conveyor jobs involving high tensions, longest possible center distances, high lifts and capacity tonnages.

FOR SUPER-TENSION CONVEYOR

.....Serving Through Science

BELT

Investigate! This belt will aid in the mechanization of mines, quarries and large construction projects. It will save industry many thousands of dollars annually through lower maintenance costs and improved efficiency of material-handling equipment. It will extend the use and range of conveyors.

Maybe you have a difficult material-handling problem that an Engineered Rubber belt can solve. Why not talk it over?

Write—Mechanical Goods Division, United States Rubber Company, Rockefeller Center, New York 20.

ANOTHER STEP FORWARD

IN 1929—United States Rubber Company brought out the first 42-oz. duck conveyor belt which soon became standard throughout industry.

IN 1938—a stronger 48-oz. duck belt was introduced by "U. S."

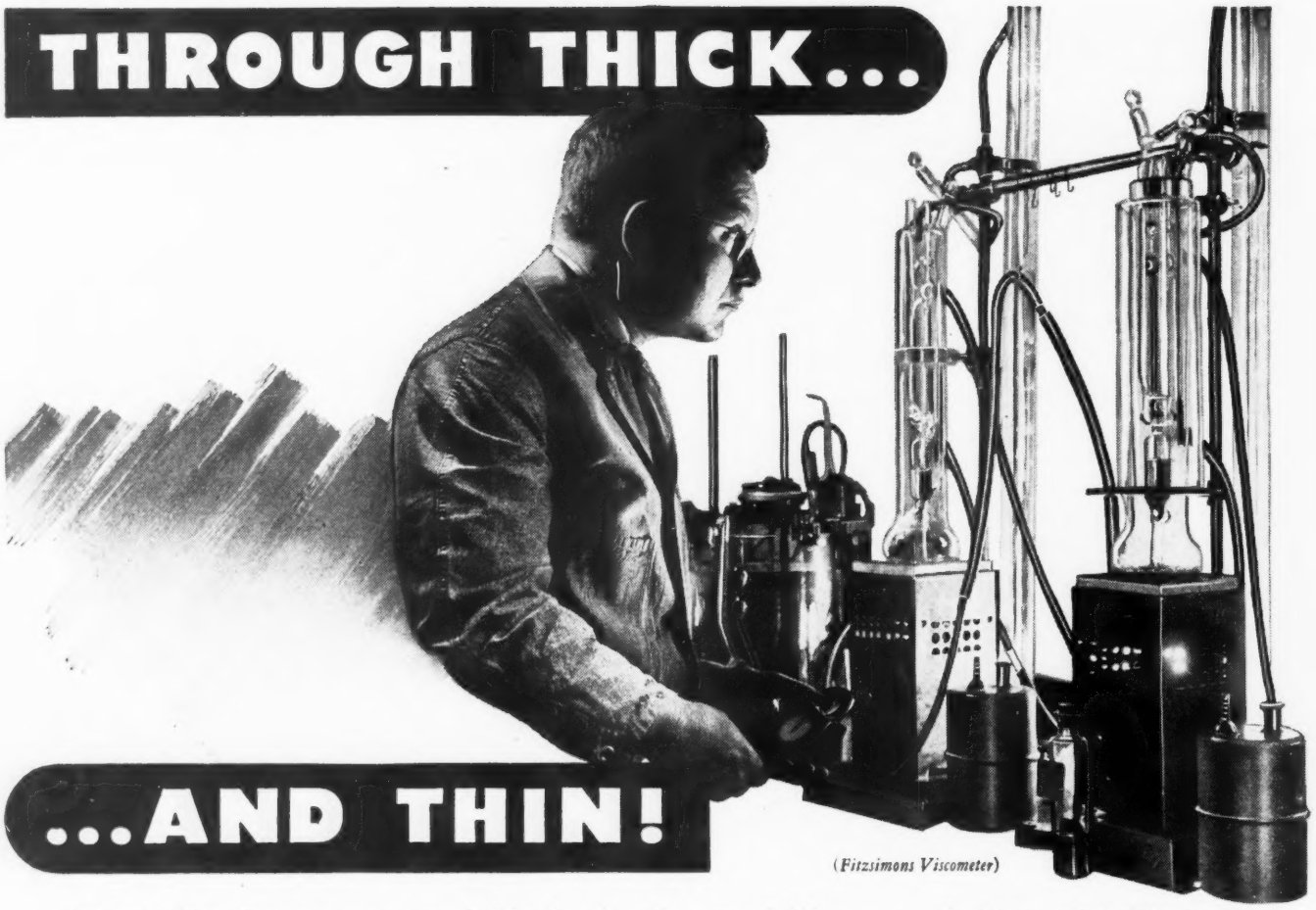
AND NOW—to meet the demand for modern mechanization—"U. S." development engineers have created an amazing new belt capable of withstanding greatly increased tensions. The combination of extra-strong Ustex yarn and flexible nylon provides a belt of exceptional strength and outstanding troughability.

*Ustex—*Registered Trade Mark of U. S. Rubber Company*

UNITED STATES RUBBER COMPANY · US · TRADE MARK

JOBS...Ore-Coal-Rock-Gravel

THROUGH THICK...



...AND THIN!

(*Fitzsimons Viscometer*)

Horatio Alger heroes never struggled harder than do research laboratory technicians today. The intent scientist above is a Sinclair Research technician . . . a skilled specialist at determining how thick or how thin Sinclair lubricating oils must be for specific applications.

With the important Fitzsimons Viscometer, a research measuring apparatus of fine precision, Sinclair Laboratory experts are able to determine with extreme accuracy viscosity characteristics in their studies of lubricants needed to protect your valuable machinery. Precise, accurate flow measurement provides information important in the development of improved products for correct lubrication with light-bodied oils for today's precision-built engines and machinery.

This viscometer is one of several different types with which Sinclair Research goes through thick and thin to assure you of industrial lubricants of proper viscosity. It is typical of the equipment and facilities which are constantly at your service in developing Sinclair lubricants of uniformly high quality to suit your specific application.

Sinclair Automotive Lubricants for Strip Mining

For Engines:
OPALINE MOTOR OIL
OPALINE TBT MOTOR OIL
(For severe service)
TENOL (Heavy Duty — For Diesels)
For Gears:
OPALINE GEAR LUBRICANTS
For Chassis:
OPALINE CHASSIS LUBRICANT
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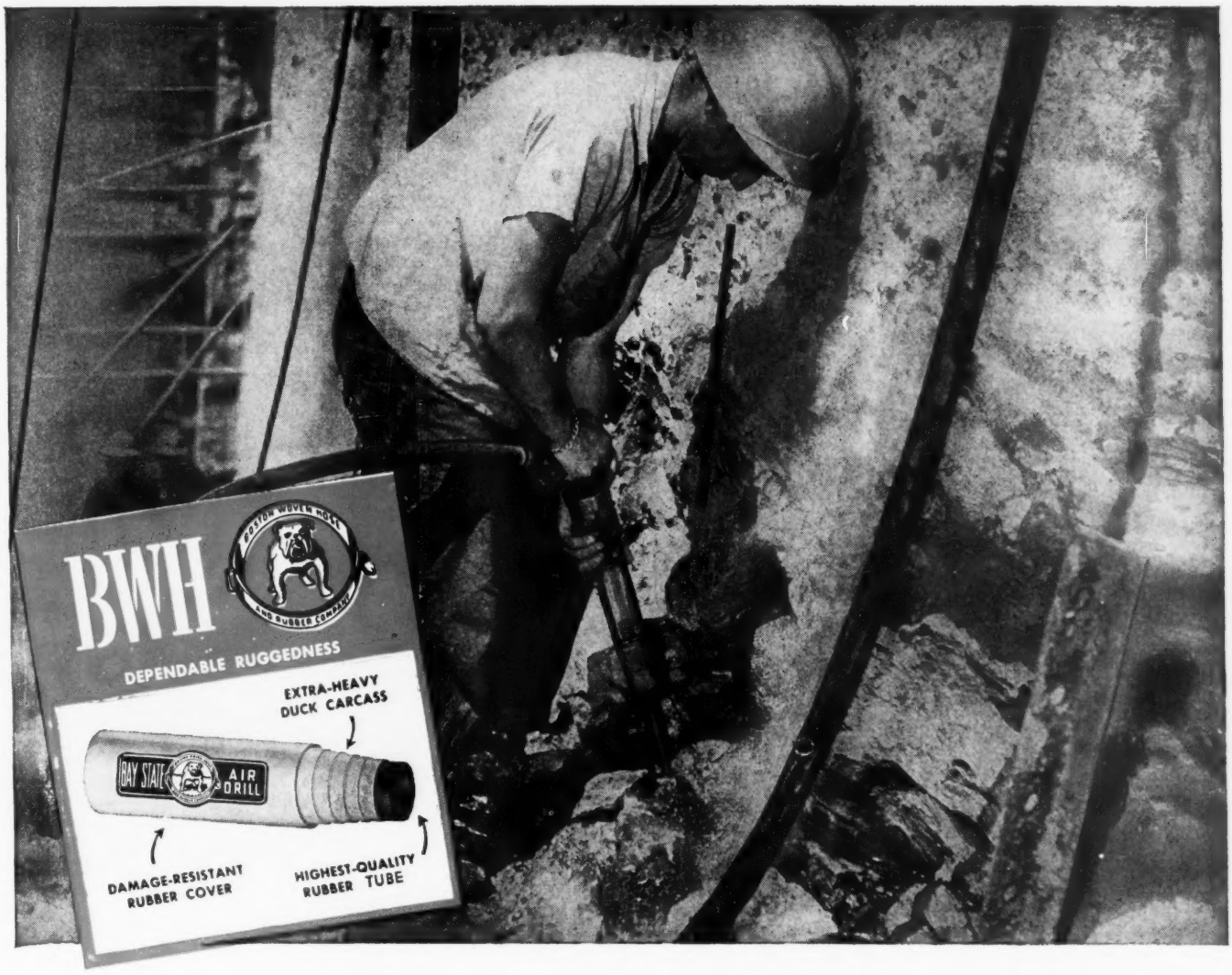
SINCLAIR

Lubricants for Industry

FINEST CRUDES + EXPERT RESEARCH and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE



"ROUGHING IT" THE EASY WAY

Another problem solved by BWH!

Applying a new facing to a big western dam posed a problem for the contractor. The old face had to be "roughed" with compressed air into an irregular pattern to hold the new concrete. That meant finding an air hose that could "take" high pressures, heat and oil from the compressors, shocks from sharp falling rocks and contact with rocky surfaces. To handle this job, BWH recommended tough Bay State Air Drill Hose.

The tube of this rugged hose is made with the highest-quality, extra-heavy rubber . . . able to withstand the deteriorating action of hot oils. Several plies of strong duck, bonded together with long-life friction, form the carcass. Since the contractor selected 2½" hose, the duck had to be 40% heavier than for smaller sizes.

Tube and carcass were encased in a tough rubber cover . . . the strongest ever devised to resist surface damage. This powerfully built hose performed perfectly . . . helped the contractor finish the job without costly delays.

Bay State Air Drill Hose is just one of the many quality products manufactured by BWH. Whatever industrial rubber goods you need, look to BWH for dependable ruggedness . . . BWH distributors for dependable service.

HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems . . . we're specialists in solving them. Consult your nearest BWH distributor, or write direct.

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in All Principal Cities

WORKS: CAMBRIDGE, MASS., U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.

HOW NEW KB INTERNATIONALS ARE *Masterfully Specialized to their Jobs*

New KB Model Internationals are the finest values in International Truck history. And International values are so outstanding that for 16 years more heavy-duty Internationals have served American commerce and industry than any other make.

But rugged quality is only one reason for International leadership. Another is International's masterful ability to *specialize* trucks to their jobs.

There are 15 basic KB Internationals. Gross weight ratings range from 4,400 to 35,100 pounds. Ten different engines are used. Axles, transmissions and tandems are available for every requirement.

International *specializes* its 15 basic KB Models into more than 1,000 different type trucks—a result of 40 years experience, engineering skill and matchless facilities. *That's fitting the truck to the job!*

Now add this: International can accurately tell every operator just what his maximum loads should be in terms of the exact conditions under which his trucks operate—an exclusive International service that enables the operator to get the most in operating economy, low maintenance costs, and long, trouble-free performance.

For details of new KB Internationals, *expertly specialized,* see your International Dealer or Branch.

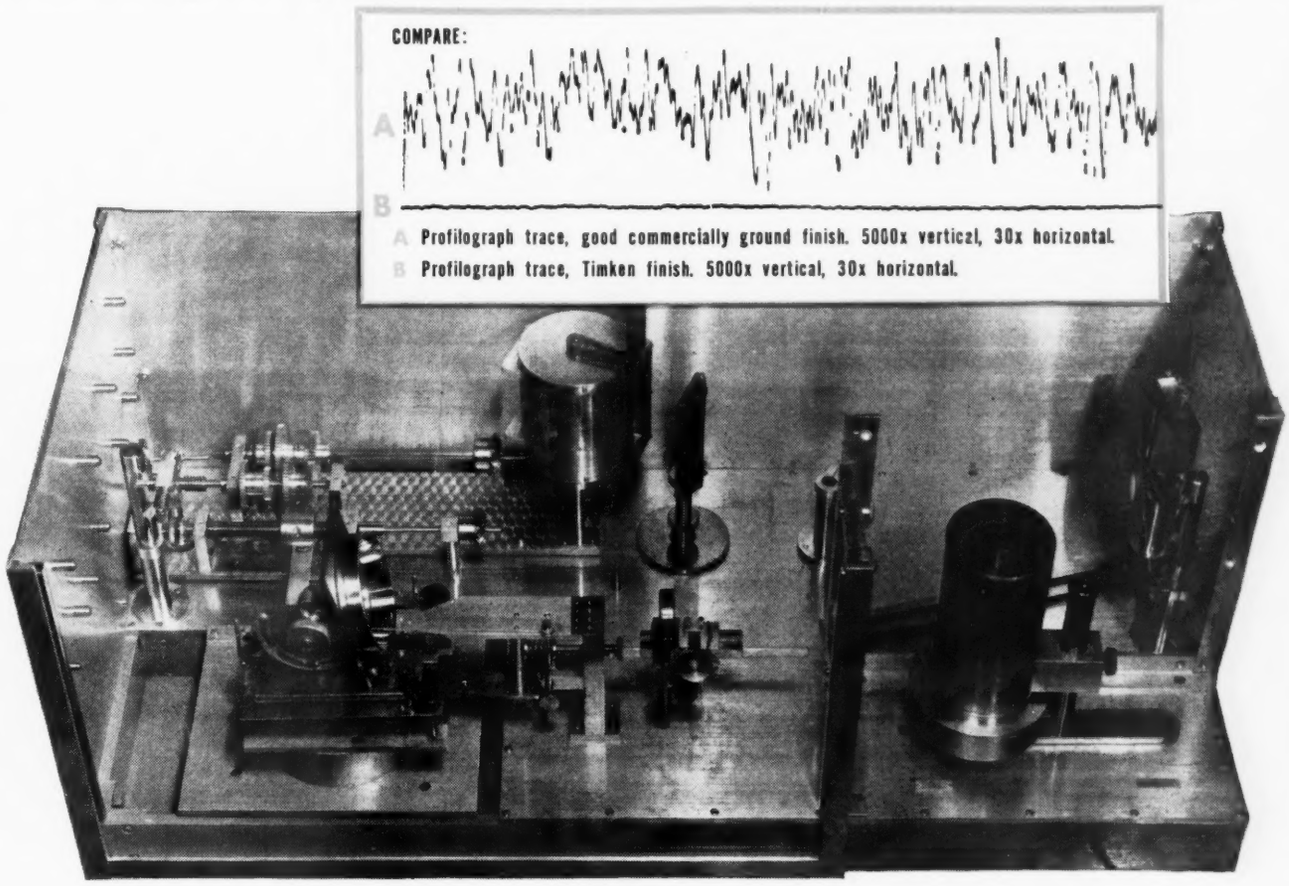
Motor Truck Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

40TH ANNIVERSARY OF INTERNATIONAL TRUCKS
1907-1947—Forty Years of International Truck Service to Industry, Commerce and Agriculture

INTERNATIONAL

INTERNATIONAL *Trucks*

Timken bearings make good mining equipment better . . . here's one of the reasons why:


COMPARE:
A
B
A Profilograph trace, good commercially ground finish. 5000x vertical, 30x horizontal.
B Profilograph trace, Timken finish. 5000x vertical, 30x horizontal.

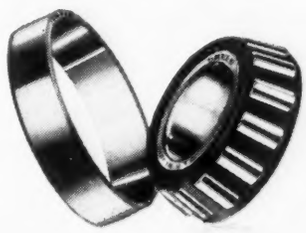
Answers the question— "How rough is smooth?"

ONE of the reasons Timken tapered roller bearings perform with such frictionless, wear-free ease is the amazingly smooth surface finish on the rolls and races —the finest known to modern bearing science.

Now, when you talk about finishes like this, you're talking about surface irregularities of only a few millionths of an inch—irregularities which are impossible to detect by any ordinary means. So, when Timken first began to develop this finish, one of the biggest obstacles was the absence of an accurate method of measuring the roughness of an apparently smooth surface.

The profilograph pictured above was the answer. Developed by Timken in 1928 and steadily improved since then, the profilograph determines surface irregularities to within one-millionth of an inch. Equipped with this measuring stick, Timken engineers were able to develop new finishing methods and machines, which have resulted in the microscopic surface accuracy of the Timken bearings you use today.

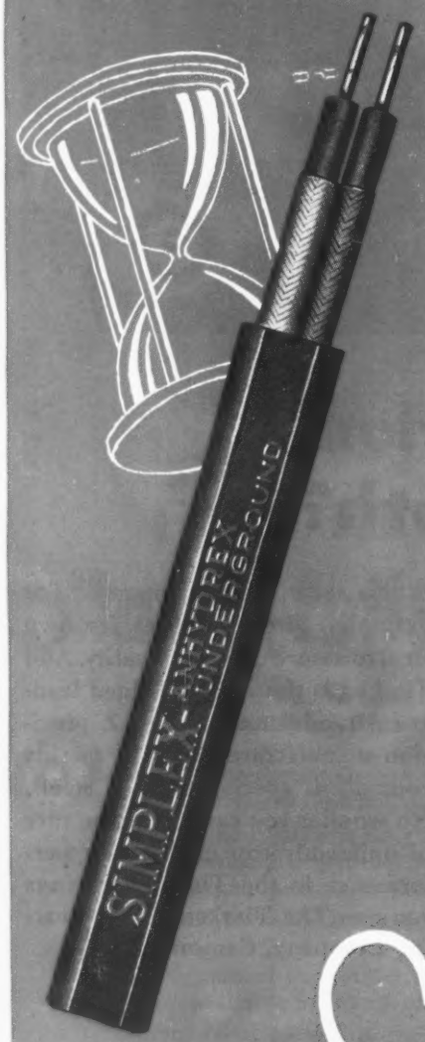
Every factor in the efficiency of a bearing is approached at Timken in this same scientific manner. For example, Timken makes its own steel to assure constant quality. And Timken is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels. No wonder you can always be sure of uniformly top quality and performance in the Timken bearings you use. The Timken Roller Bearing Company, Canton 6, Ohio.



TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◐ AND THRUST —◐— LOADS OR ANY COMBINATION —✳—

SAVE TIME... *use the phone*



A dependable telephone system is one of the best means of increasing safety, keeping up production, preventing mistakes and helping to rectify them when they occur.

Unless the telephone cable you install has good talking qualities you cannot expect to get the most out of your system. That is why we recommend Simplex-ANHYDREX Mine Telephone Cable.

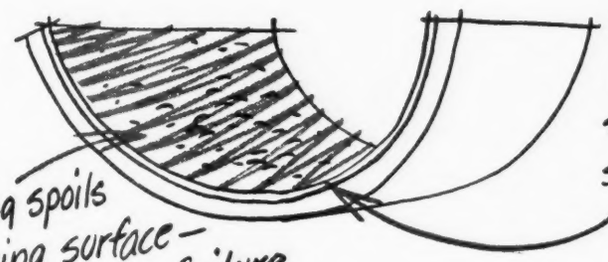
Simplex-ANHYDREX Mine Telephone Cables have very fine talking qualities and they will take a lot of abuse that ordinary telephone wire won't take. The tough neoprene jacket will resist much of the mechanical abuse that is their lot and the high-grade Simplex-ANHYDREX insulation will preserve the unusually good talking qualities of the cable for a long period of years. The next time you need to install telephone wire consider Simplex-ANHYDREX Mine Telephone Cable.

SIMPLEX WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

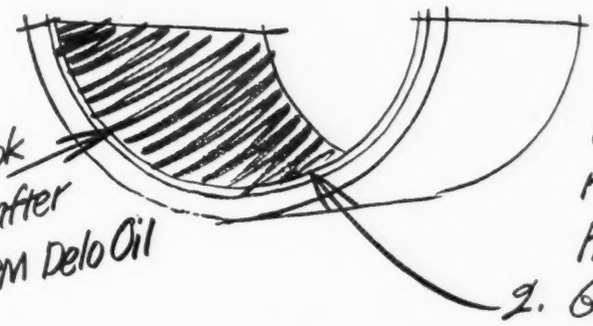
LUBE MEMO

Why it's smart to avoid "metal eating" lube oils



Heat and air in Diesels make many oils corrosive so they "eat" lead from structure of alloy bearings

pitting spoils bearing surface — leads to failure



Joe says bearings look like this after using RPM Delo Oil

1. RPM Delo Diesel Engine Lubricating Oil contains anti-oxidant compound, resists effects of heat and air.
2. Gives bearings direct protection against corrosion.

DISTRIBUTED BY

Gordon Lubricating Company

IN PENNSYLVANIA, OHIO, WEST VIRGINIA, KENTUCKY

1023 OLIVER BUILDING
PITTSBURGH, PA. AT. 5172

ANDOVER ROAD, COLUMBUS, OHIO.
KINGSWOOD 1495

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Transcentral Oil Corporation

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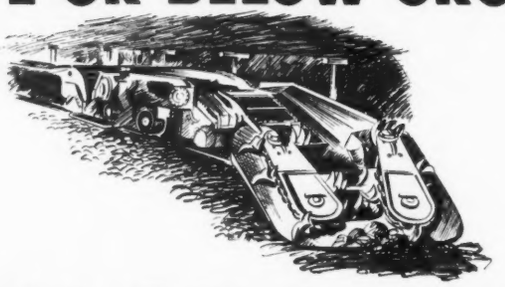
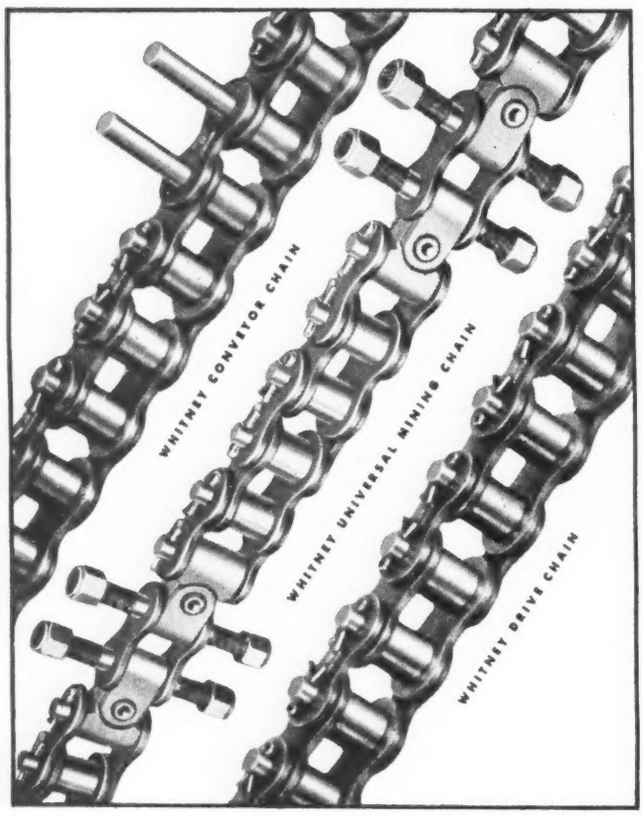
ABOVE OR BELOW GROUND



WHITNEY CHAIN DRIVES

are tonnage producers



Whitney chain . . . loader, conveyor or drive . . . is one investment that will pay out daily profits.

Made of selected heat-treated alloy steel, these tough, rugged chains keep equipment producing on schedule. They stand up under the severest of operating conditions . . . resisting shock loads without breakage. Whitney Chain Drives help give you lowest cost-per-ton production wherever they are used . . . in the preparation plant or up-at-the-face.

Accurately designed Whitney Cut Tooth Sprockets complete the combination for overall drive efficiency. Like Whitney Chains they are made to insure smooth operation and give long wearing life.

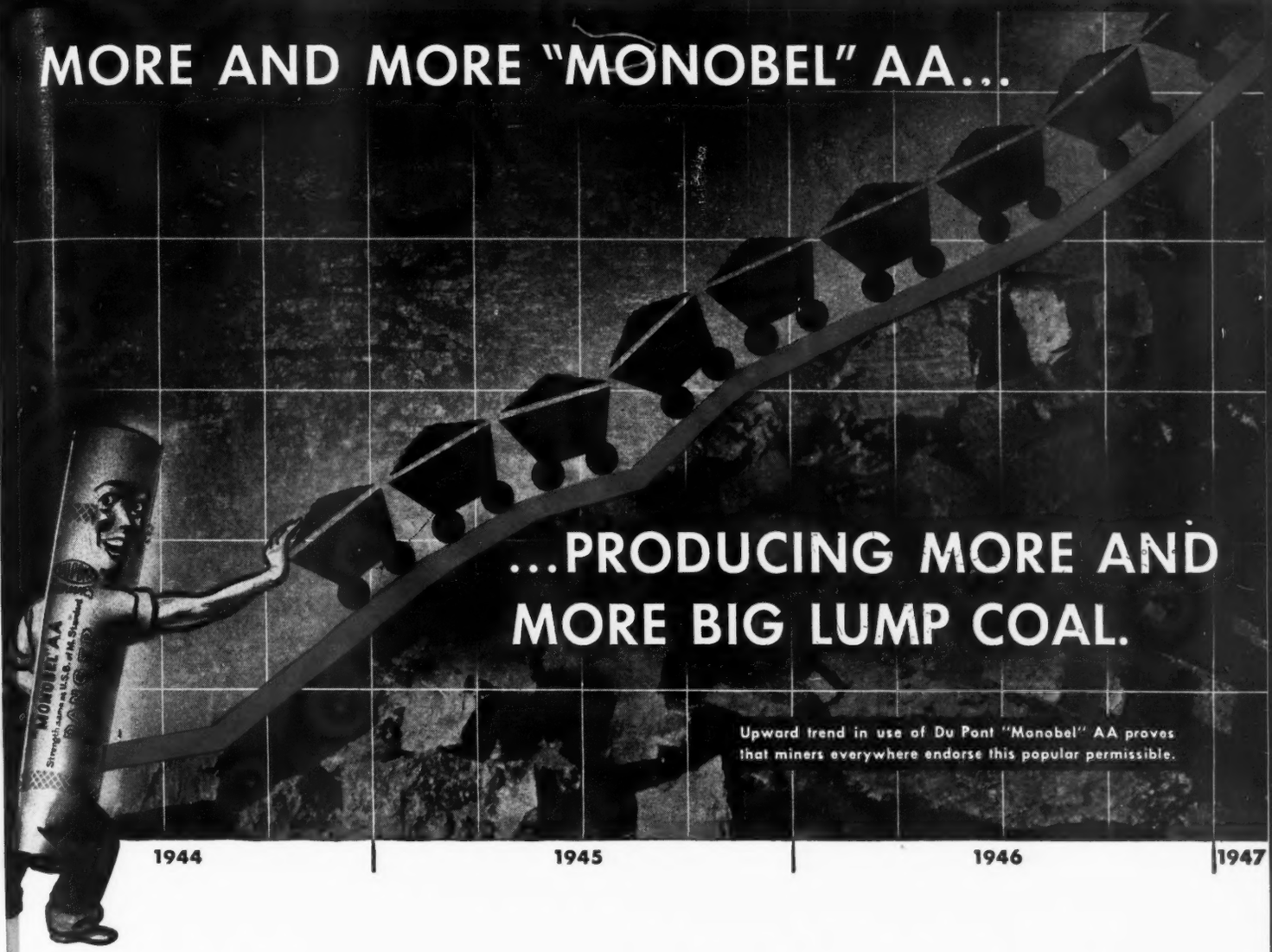
Standardize on Whitney Chains and Cut Tooth Sprockets . . . the all-steel drives . . . and you'll get greater output and less down time.

THE WHITNEY CHAIN & MFG. COMPANY

Your Assurance of Proven Power, Transmission and Conveying Since 1896

HARTFORD 2, CONNECTICUT

MORE AND MORE "MONOBEL" AA...


MONOBEL AA
...PRODUCING MORE AND MORE BIG LUMP COAL.
Upward trend in use of Du Pont "Monobel" AA proves that miners everywhere endorse this popular permissible.
1944
1945
1946
1947

...the permissible that helps get more coal faster

AS THE graph shows, ever since "Monobel" AA was introduced little more than three years ago, demand for this new product of Du Pont Explosives Research has steadily grown. Today it is the largest selling permissible ... widely used and approved as an economical coal-getter.

"Monobel" AA produces big lump by the carload. It's a powerful dynamite with a slow heaving action that piles the coal where mechanical loaders can quickly get at it. Result: increased loading efficiency and high percentage recovery.

The excellent water-resisting qualities of Du Pont "Monobel" AA insure effective shots even when extremely wet conditions prevail. It's an ideal powder for high, hard-shooting seams and it will do any ordinary rock or slate work. Shears ribs and face clean and square whether top or bottom cutting is practiced. Many mine foremen find that "Monobel" AA allows reduction in the number of permissibles used. In addition, Class A fumes permit quick return to the face.

Why not give Du Pont "Monobel" AA a try? Discover for yourself why it has become the leading permissible for getting more coal out—faster. Any Du Pont Explosives representative will give you complete information.

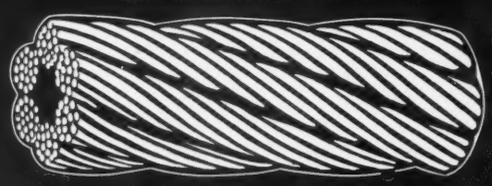
E. I. DU PONT DE NEMOURS & CO. (INC.)
Explosives Department, Wilmington 98, Delaware

DU PONT PERMISSIBLES *Blasting Supplies and Accessories*

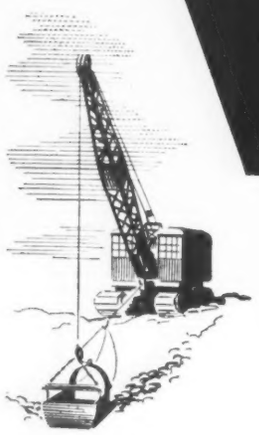
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

DU PONT
REG. U.S. PAT. OFF.

Resists Abrasion Better...



UPSON-WALTON LANG LAY ROPE



U-W Lang Lay (in which, unlike other types of wire rope, the wires and strands are twisted in the *same* direction) offers many advantages to many users.

For dragline excavators . . . shovels . . . slope haulages and inclines; for backfillers, slushers, carryall scrapers, and traction ropes on aerial tramways—wherever there are severe abrasion conditions and wherever exceptionally good flexibility and maximum resistance to bending fatigue are necessary, U-W Lang Lay rope can be counted upon to do the best job.

Lang Lay provides the greatest resistance to abrasion because the outer wires have a much greater wearing surface—*almost three times as much as regular lay!* This, in turn, provides greater metallic bearing which reduces wear on sheaves and drums as well as on the rope itself. It should, however, in almost all cases be *Preformed* to prevent untwisting and provide longer service at lower operating cost.

U-W Lang Lay ropes are available with hemp center or IWRC (Independent Wire Rope Center).

For best service where wear is hardest, specify *U-W Lang Lay, Perfection Grade, Layrite Preformed.*

U-W

Established 1871

All Upson-Walton Products Available Through Your Local Upson-Walton Distributor

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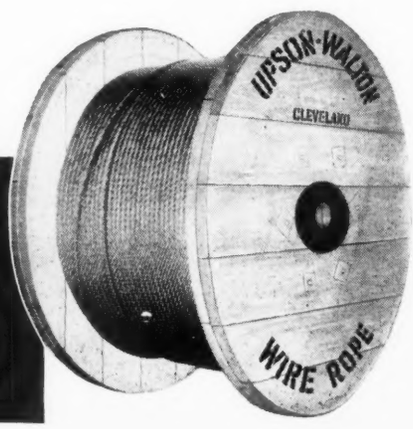
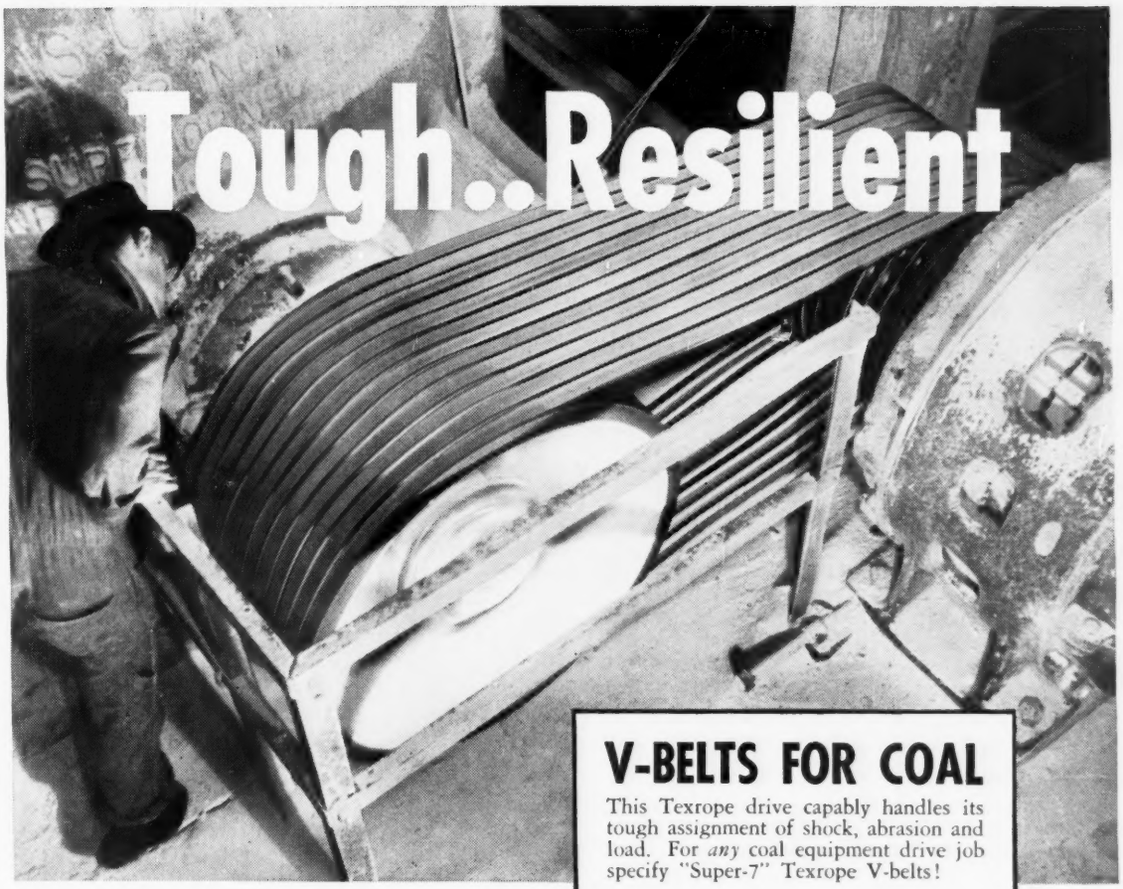


THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

MAIN OFFICES AND FACTORY: CLEVELAND 13, OHIO

114 Broad Street, New York 4 — 737 W. Van Buren Street, Chicago 7 — 241 Oliver Building, Pittsburgh 22



V-BELTS FOR COAL

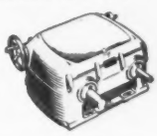
This Texrope drive capably handles its tough assignment of shock, abrasion and load. For *any* coal equipment drive job specify "Super-7" Texrope V-belts!

TEXROPE ..Greatest Name in V-Belt Drives

"Super 7" V-BELTS
Five Types — Sizes to suit every power transmission job.

Texsteel, Texdrive, "Magic-Grip"
— sheaves in a full range of sizes, grooves.

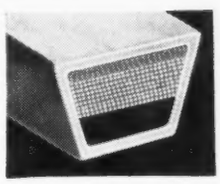
"Vari-Pitch" SHEAVES
Exact variations in speed, stationary or motion control.



SPEED CHANGERS
Speed variations up to 375% at the turn of a crank.

ENGINEERING
Finest V-Belt engineering talent in the world—at your call.

TEXROPE "Super 7" V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich. They are sold only by A-C.



. . . You get 7 Great Features in "Super 7" Texrope V-Belts

1. TOUGHER COVER. Two layers of tightly woven long-staple cotton fabric and tough, wear-resistant rubber compound. Protects the belt carcass from grit, moisture and wear — holds its shape — assures maximum belt life.

2. SHOCK ABSORBING. "Super 7" belts combine great strength with the degree of resiliency necessary for long life and smooth power transmission.

3. HEAT RESISTING. *All* "Super 7" V-belts are designed and built to give high resistance to heat.

4. STRONGER CORDS. More cords—imbedded in cool-running rubber compound. A powerful load-carrying structure.

5. PRECISION CURED in pressure molds to assure accurate section and perfect bonding of cords, cover and cushion.

6. ACCURATELY MATCHED. Every belt weighed, measured and carefully inspected before being sized and packed.

7. ENGINEERING LEADERSHIP. "Super 7" Texrope V-belts represent 22 years of research and experience — by Allis-Chalmers, originator of the Multiple V-belt drive.

"Super 7" Texrope V-belts come in five types to meet every operating requirement: *Standard — Heat Resisting — Oil Resisting — Oil Proof* and *Static Resisting*. Call your Allis-Chalmers office or dealer. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

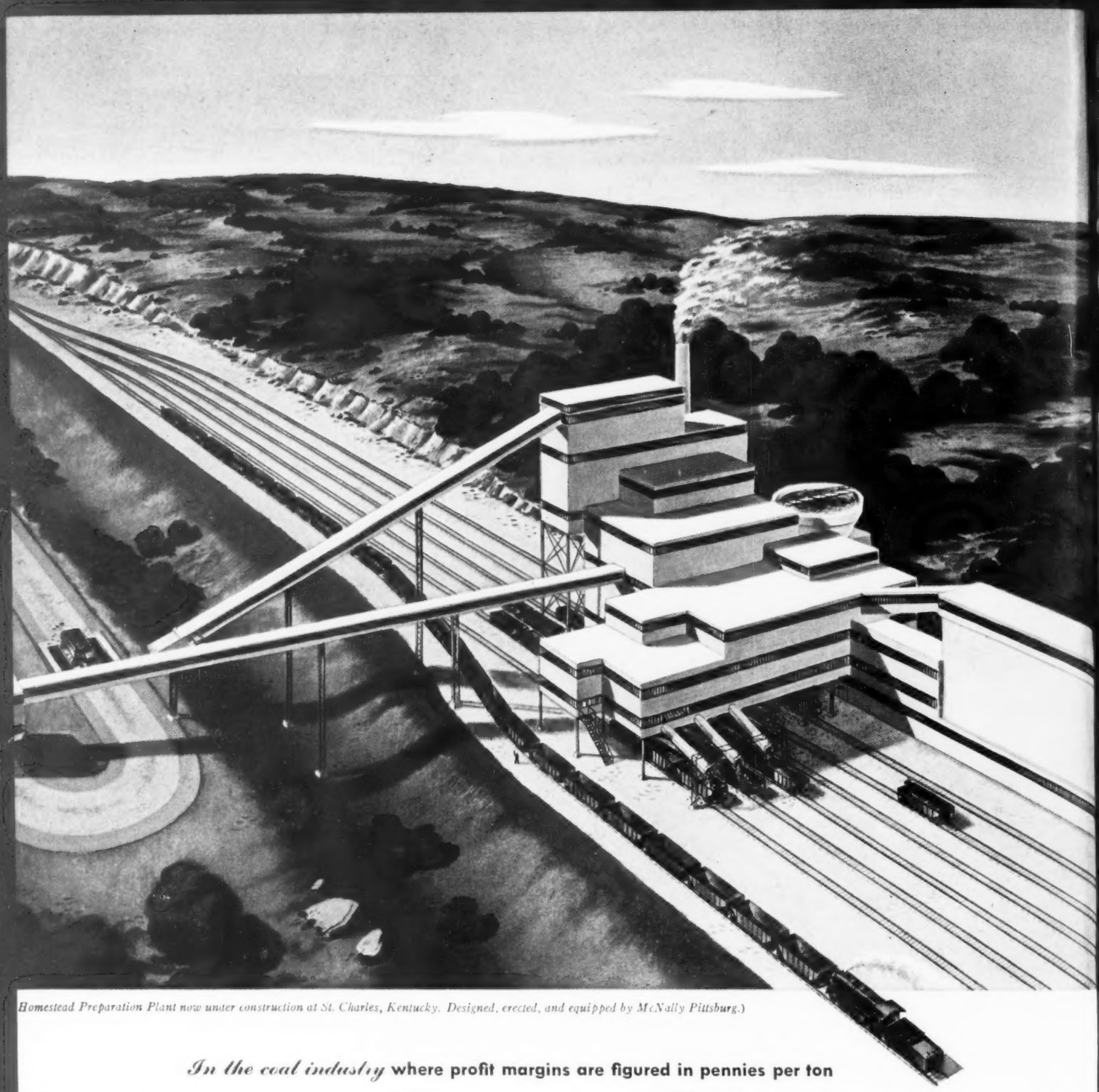
A 2238-A

Refer to Sweet's Catalog.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947
A CENTURY OF SERVICE
to Industry
THAT MADE
America Great



Homestead Preparation Plant now under construction at St. Charles, Kentucky. Designed, erected, and equipped by McNally Pittsburg.)

In the coal industry **where profit margins are figured in pennies per ton**

Plants That Produce *Specification Fuel* Reap Rich Rewards

In an industry where money is plentiful the construction of a plant involving a large capital investment does not require the exercise of much courage on the part of management.

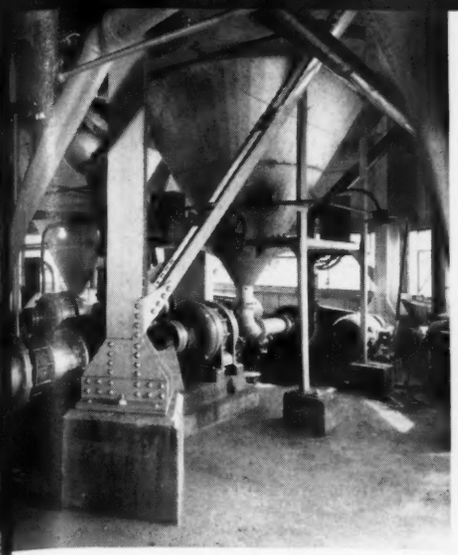
But in the coal industry things are different! There, the men at the top have to stretch their dollars and draw deeply upon their imagination, foresight, and vision of the future for coal.

The men at the head of Homestead had that kind of vision and engineering imagination. The profit-making plant pictured here will soon be in operation as a tribute to their great ingenuity and business ability.

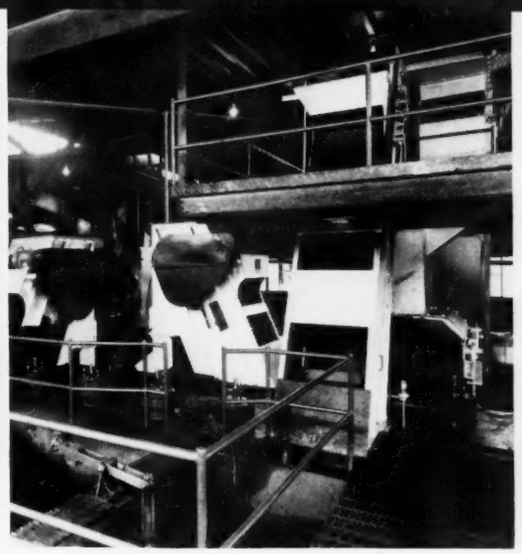
Whatever may be said about mechanization—or the lack of it—"down under," coal "topside" is being prepared, at mine after mine, by a fully mechanized process which, at the touch of a button, is producing a manufactured product for which coal users gladly pay premium prices.

McNally Pittsburg Manufacturing Corporation— **Works: Pittsburg, Kansas • Wellston, Ohio**

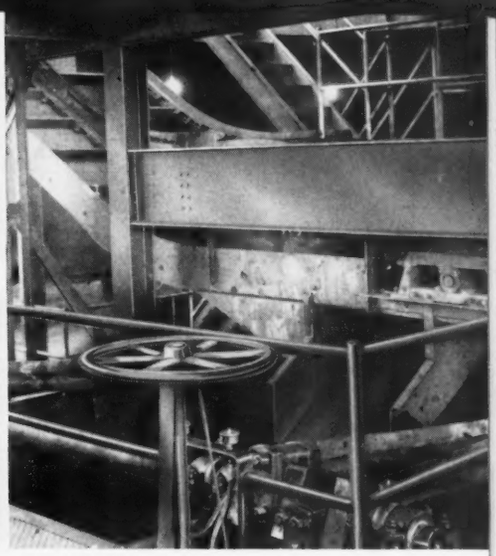
Engineering & Sales Offices: Pittsburg, Kan. • Chicago (1), Ill. • Pittsburgh (22), Penna. • Wellston, Ohio • Caixa Postal 1310, Rio de Janeiro, Brazil



● View of pump room, located beneath Main Settling Cone.



● Raw coal wash box where coal and refuse are automatically separated.

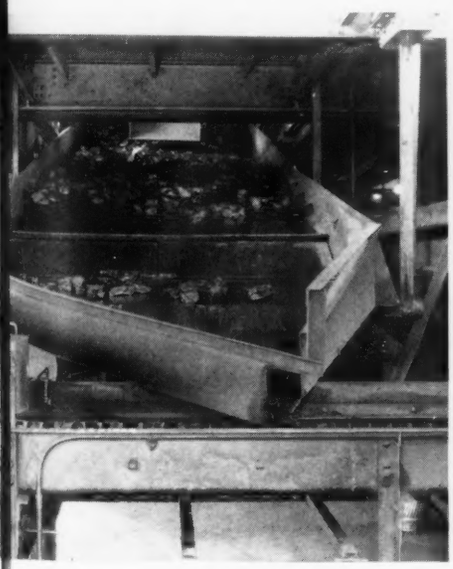


● McNally Pittsburg forged crankshafts are designed for long life.

● Washed coal classifying screen with remote-control gates and valves.

● Stoker coal crusher equipped with high speed reversible adjusting ratchet.

● Coal control laboratories for continuous check on raw coal and cleaned products.



. . . And for mine operating officials **a McNally Pittsburg Preparation Plant**

Sings a Steady Song of *Production Achievement*

The smooth hum of coal preparation machinery is music to the production man . . . a definite indication that he can now meet the demands of his sales department and the ultimate consumer for *more* specification fuel.

Hour after hour, in the preparation plant, coal is automatically washed, dried, graded into a uniform product . . . up to the maximum possibilities of the raw coal.

New ***marketable mixtures*** can be blended in the plant's washed coal classifying screens. Salable "orphan" grades of washed coal can be brought back, reduced to premium stoker grade in the flexible crushing and re-screening equipment.

Preparation plants aren't built just for a day. They're streamlined for today's production needs—planned to cover expansion and market requirements of a faraway tomorrow.

Our technical staff will be glad to explain how a McNally plant can sing a song of production achievement for you.

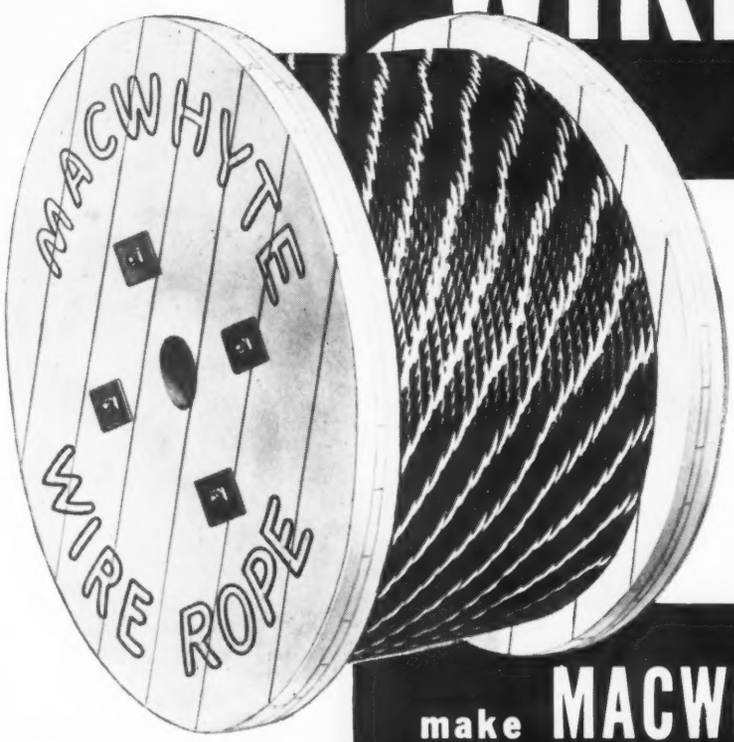
McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

a thousand and one

MACWHYTE WIRE ROPES

When you use the correct wire rope, both the rope and your equipment last longer, cost less to operate. Macwhyte consulting engineers will check your equipment and recommend the wire rope specifically engineered for your job. Ask your Macwhyte distributor, or write Macwhyte Company.



...all job-proved...

assure you the correct

rope for your equipment

make MACWHYTE your headquarters for WIRE ROPE and SLINGS

MACWHYTE PREFORMED AND NON-PREFORMED INTERNALLY LUBRICATED WIRE ROPES... MONARCH WHYTE STRAND Wire Rope ...Special Traction Elevator Rope ...Stainless Steel Wire Rope ...Monel Metal Wire Rope... Galvanized Wire Rope... Atlas Braided Wire Rope Slings, Hi-Fatigue Aircraft Cables, Assemblies and Tie-Rods. Catalogs on request.

NO. 918

MACWHYTE WIRE ROPE

Manufactured by Macwhyte Company
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Mill Depots: **New York · Pittsburgh · Chicago · Minneapolis · Fort Worth**
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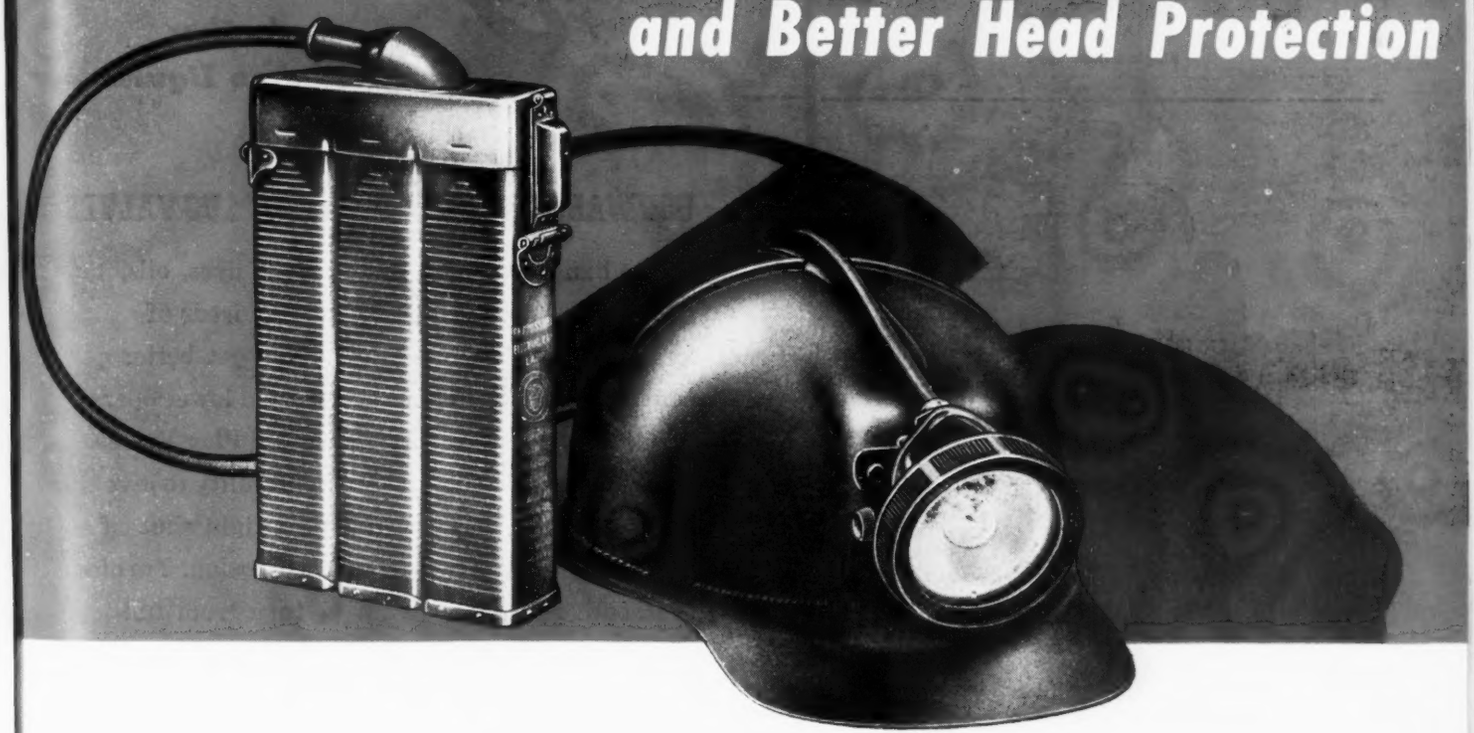
Distributors throughout the U.S.A. and other countries

Guardians of SAFETY

through Better Light . . . better directed on the job and Better Head Protection



EDISON ELECTRIC CAP LAMPS

M. S. A. COMFO CAPS

A most important consideration in mining is *safety* for the men underground. When your workers are 100% Edison Electric Cap Lamp-equipped, you've taken a big step forward in safety as well as in production efficiency. Edison Lamps supply *better* light, *safe* light, *dependable* light . . . over many years of useful life. Join these Lamps to M.S.A. Comfo Caps and you give your miners the maximum in personal protection. *We'll gladly demonstrate!*

MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STREETS . . . . . PITTSBURGH 8, PA.

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MINE SAFETY APPLIANCES CO. (S.A.) (PTY) LTD.
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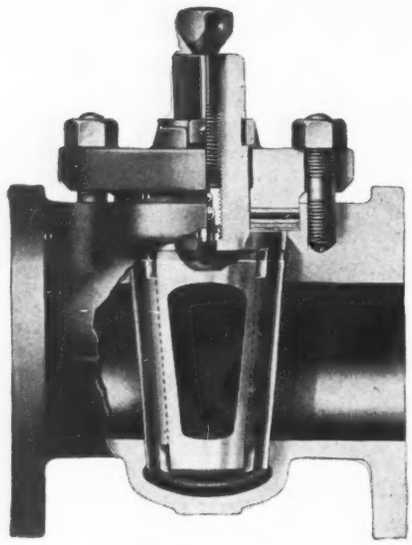
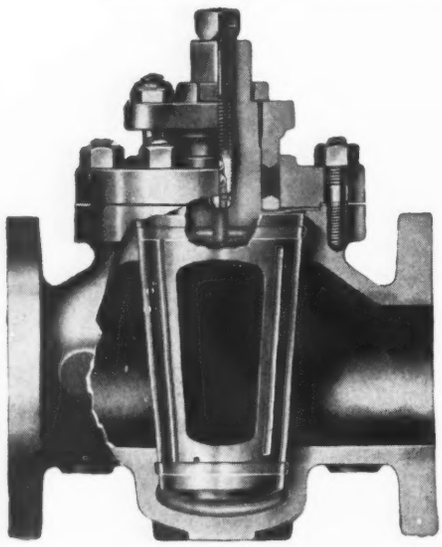
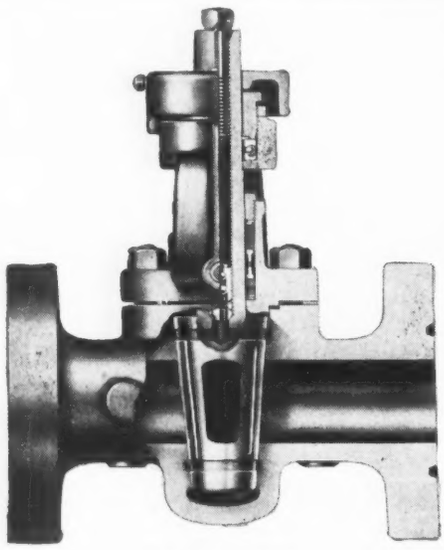


Single Gland Type



Regular Gland Type



Ball Bearing Type

FOR HANDLING

Acids... Solvents... Sludges...

and other troublesome liquids—

USE WALWORTH LUBRICATED PLUG VALVES

When handling acids, condensates, dyes, oils, solvents, solutions, slurries and hundreds of similar "troublesome" liquids, you get better control, more dependable service and lower operating costs with Walworth Lubricated Plug Valves.

These valves have proved their ability to give easy operation . . . fast action . . . tight shut off . . . greater protection against corrosion. Turning is smooth and easy; just a ¼ turn from full-opening to full-closing. Moreover, Walworth Lubricated Plug Valves are tightly sealed against leaks — *whether open or shut.*

Walworth Lubricated Plug Valves are available in sizes ½" to 24" for pressures from 125 to 5,000 psi, and for vacuum requirement. For further information about Walworth's Complete Line of Lubricated Plug Valves, see your Walworth distributor or write for Catalog No. 46L.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Production's Up

WHEN YOU HANDLE COAL WITH JOY LOADERS

MORE TONS PER MINUTE...

MORE ECONOMICALLY, TOO,

There's a Joy Loader for every seam condition!

HIGH SEAM

Joy 11 Bu . . . heavy duty for 60" or more seams . . . rated at 5 tons per minute. Joy gathering arms assure minimum degradation . . . fast loading.

LOW SEAM

Joy 14 Bu . . . high production low vein machine with approximate loading speed of 5 tons per minute. Produced in 30" to 36" heights, its conveyor swings 45° to either side.

CONVEYOR MINING

Joy 12 Bu . . . rated at 1 ton per minute, this 28" high machine is primarily a thin seam loader particularly adapted to loading onto conveyors because of its low height.

Consult a Joy Engineer

W&D CL1144

JOY DIVISION

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH, PA.

Split-Second Timing pays off . . .

ATLAS ROCKMASTER BLASTING gets results

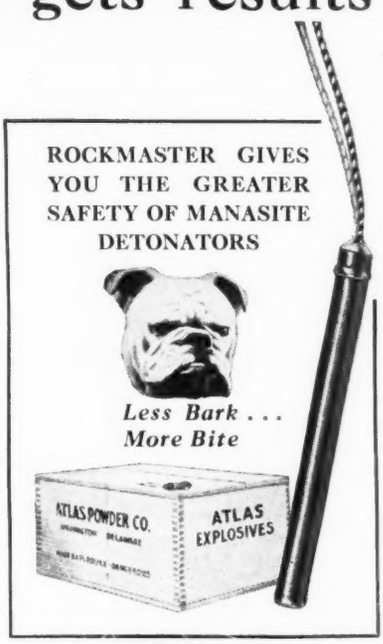
In golf the right club plus know-how, plus split-second timing that applies power at just the right moment produces the shot that pays off. The precision timing of the new Atlas Rockmaster Blasting System is paying off. Never before has the blaster been able to achieve such amazing control of timing. And never before has he had such sensational results.

Atlas Rockmaster makes it possible for the blaster to time the delay elements of his shot in thousandths of a second. A split-second after the rock is knocked off balance by the first blast, it is hit again . . . with results you actually have to see to believe.

When Rockmaster is used dollars are saved. A tremendous increase in fragmentation is being reported by blasters all over the country . . . in many instances the increase is as high as 30%. Secondary shooting has been cut down . . . shovel efficiency stepped-up. And trouble-making complaints due to noise and vibration have practically disappeared.

Rockmaster is not just a timing device. Rockmaster is a complete blasting system of which precision timing is only a part. All factors of the blasting problem—detonators, explosive and loading—are taken into account and combined with your know-how and ours to produce true Rockmaster effectiveness.

To get outstanding results yourself, call in the Atlas representative and ask him how Rockmaster can be adapted to your blasting problem.



Manasite: Reg. U. S. Pat. Off. "ROCKMASTER"—Trade Mark

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

Kennametal bits costly?

Not when they can cut an average of 2 1/2 tons of coal for—

KENNAMETAL BITS ARE MANUFACTURED TO FIT ALL STANDARD MAKES OF CHAINS

U1	Short or Longwall Machines	Cincinnati	Goodman	Jeffrey	Prox	Sullivan	Tracy
U2	Number 50, 52, 54 Chains	——	Goodman	Buddy Sullivan	——	——	——
U3	Mounted Track or Rubber Tired Gage	Cincinnati	Goodman	Jeffrey	Prox	Sullivan	Tracy
U4	Mounted Track or Rubber Tired Gage	Cincinnati	Goodman	Jeffrey	Prox	Sullivan	Tracy
U5	Mounted Track or Rubber Tired Gage	Bowdil, ML Type only	——	——	——	——	——
U6	Mounted Track or Rubber Tired Gage	Cincinnati Duplex	——	——	——	——	——
U7	Mounted Track or Rubber Tired Gage	Cincinnati	Goodman	Jeffrey	Prox	Sullivan	Tracy
U8	Short or Longwall Machines	Cincinnati	Goodman	Jeffrey	Prox	Sullivan	Tracy

PRICES

CAT. NO.	Prices Each in Lots of		
	50-99	100-499	500 or more
U1	$1.15	$1.05	$.95
U2	1.15	1.05	.95
U3	1.15	1.05	.95
U4	1.15	1.05	.95
U5	1.30	1.20	1.10
U6	1:30	1.20	1.10
U7	1.35	1.25	1.15
U8	1.35	1.25	1.15

KENNAMETAL

MINING DIVISION

KENNAMETAL INC., LATROBE, PA., U. S. A.

Some examples where the coal seam is medium hard to hard are:

Washington County, Pa., Pittsburgh Seam:
Bit cost per ton of coal mined — .4 of one cent.

Somerset County, Pa., "B" Seam:
Bit cost per ton of coal mined — .36 of one cent.

Harrison County, W. Va., Pittsburgh Seam:
Bit cost per ton of coal mined — .98 of one cent.

At the Brownfield Coal Co., Moxahala, Ohio, No. 6 Seam, the bit cost per ton of coal mine was reduced from 12 cents to 1 cent.

There are other ways Kennametal bits help to reduce the total cost of cutting coal. Fewer bit changes are required and fewer men are needed to sharpen, handle and haul bits to and from the face. Less time is wasted changing and resetting bits. The machine operates at lighter loads—lasts longer—cuts faster—because the hard, wear-resistant Kennametal cutting edge stays sharp long after steel bits dull.

In seven out of ten cases cuttings are larger . . . less "bug dust" is formed.

Despite the fact that Kennametal bits are priced at between $.95 and $1.35, depending on size and quantity, they lower cost in terms of less labor, less maintenance on machines, lower power cost, and increased mining efficiency.

A Kennametal representative will be glad to contact you for a demonstration. Simply write Mining Division, Kennametal Inc., Latrobe, Pennsylvania.

KEY TO MORE *Unit Responsibility*

This huge walking dragline contains 23 Westinghouse motors, totaling 4,037 horsepower. It can dig 130 feet deep, pick up a load of 32 tons in one bite, dump it 437 feet away and return . . . all in 60 seconds! Secret of the faster operation is Westinghouse *Rototrol,* a rotating-type regulator which provides smooth, fast acceleration and deceleration.

Maximum continuity of service and safety to men and equipment are major items in electrical supply for strip mining equipment. In addition, the power distribution system must have a high degree of flexibility to serve shovels, draglines and other pit equipment.

The many years of "on the job" experience of Westinghouse engineers assures advanced electrical and mechanical design to meet these rigid requirements.

Westinghouse can supply *every* electrical mine requirement . . . from power production to machine drives. Planned distribution systems, ground protection, rectifiers, motor-generators, transformers, switchgear equipment, motors of all types, and Rototrol (simplest of rotating controls) . . . all are a part of Westinghouse single-source responsibility for putting power to work *productively.*

Westinghouse field engineers are always ready to survey mine requirements and make definite recommendations. Call your nearest Westinghouse office. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-94741

PRODUCTIVE POWER

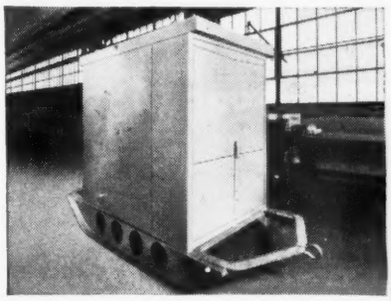
"WESTINGHOUSE-EQUIPPED THROUGHOUT" MEANS SIMPLIFIED ORDERING, QUICKER INSTALLATION, MORE EFFICIENT OPERATION

Putting power to work *productively* can be a major problem . . . or a simple one. When items must be selected, ordered and received from many sources, it means many chances for costly errors and delays . . . divided responsibility—or none at all—for performance of installed equipment.

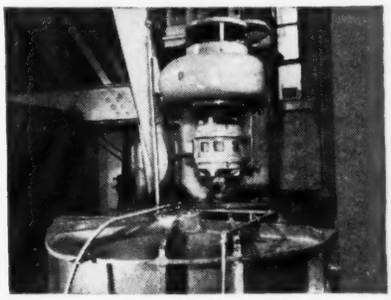
Westinghouse offers the way to simplify the job. From equipment for generation of electrical or steam power, to the most specialized types of drives, gearing and control for its utilization, Westinghouse provides a single source of supply . . . one broad pair of shoulders competent to take responsibility for performance of all parts of the job.

Here are a few of the places where Westinghouse unit responsibility prevents headaches . . . saves money . . . assures more productive power.

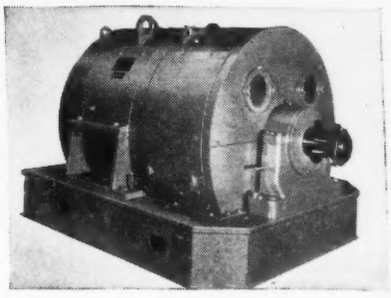
PORTABLE SWITCH HOUSES . . . materially reduce the hazards in serving pit equipment, and at the same time, speed the process of changing cables.



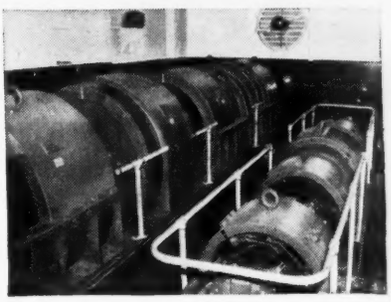
VERTICAL SWING MOTOR . . . mounted on top of gear case. One of three such motors used to rotate the cab of a 40 cu. yd. shovel.



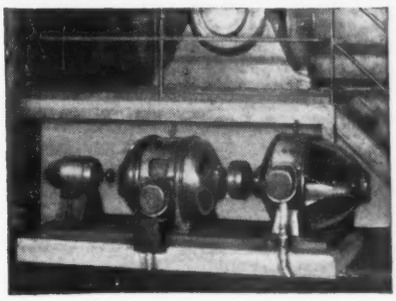
LOCOMOTIVES . . . Westinghouse builds most types of mine locomotives required for the transportation of coal, ore and supplies—above and below ground.



HOIST OR DRAG MOTION MOTOR . . . one of four such 425 hp motors used on large shovels and draglines. The outstanding feature of these motors is their low WR^2 design.



MOTOR-GENERATOR SETS . . . built especially sturdy to meet the requirements of heavy-duty mining service. The motor-generator sets, shown here, provide the power needed for shovels or draglines.



ROTOTROL . . . is a variable voltage drive control which provides preset, uniform acceleration and deceleration, maximum efficiency, maximum swing and return speed with accurate spotting of pickup and drop.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

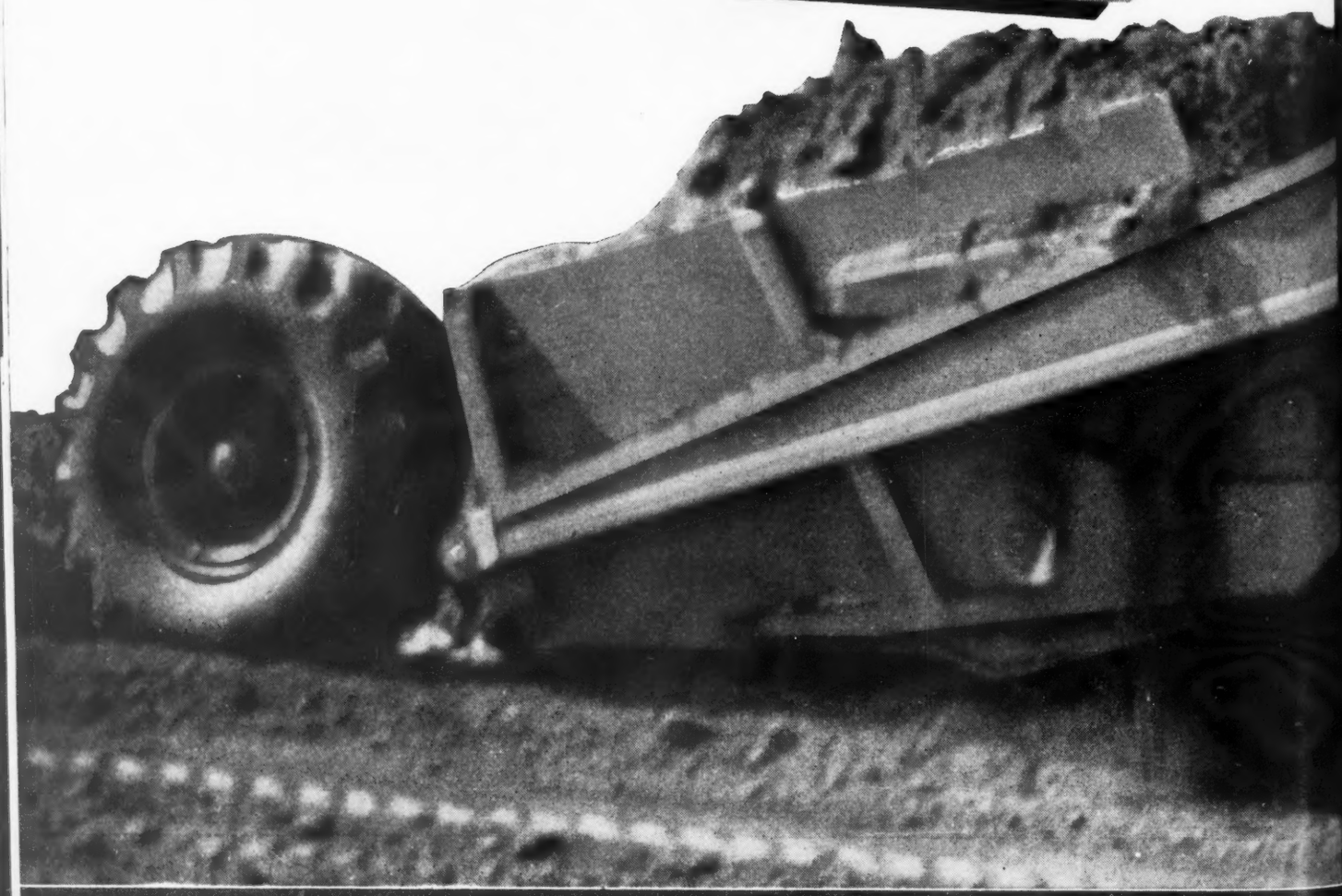
MORE PRODUCTIVE POWER FOR INDUSTRY

You make money
Extra Capacity

MORE YARDS per trip

MORE TRIPS per hour

MORE HOURS per season



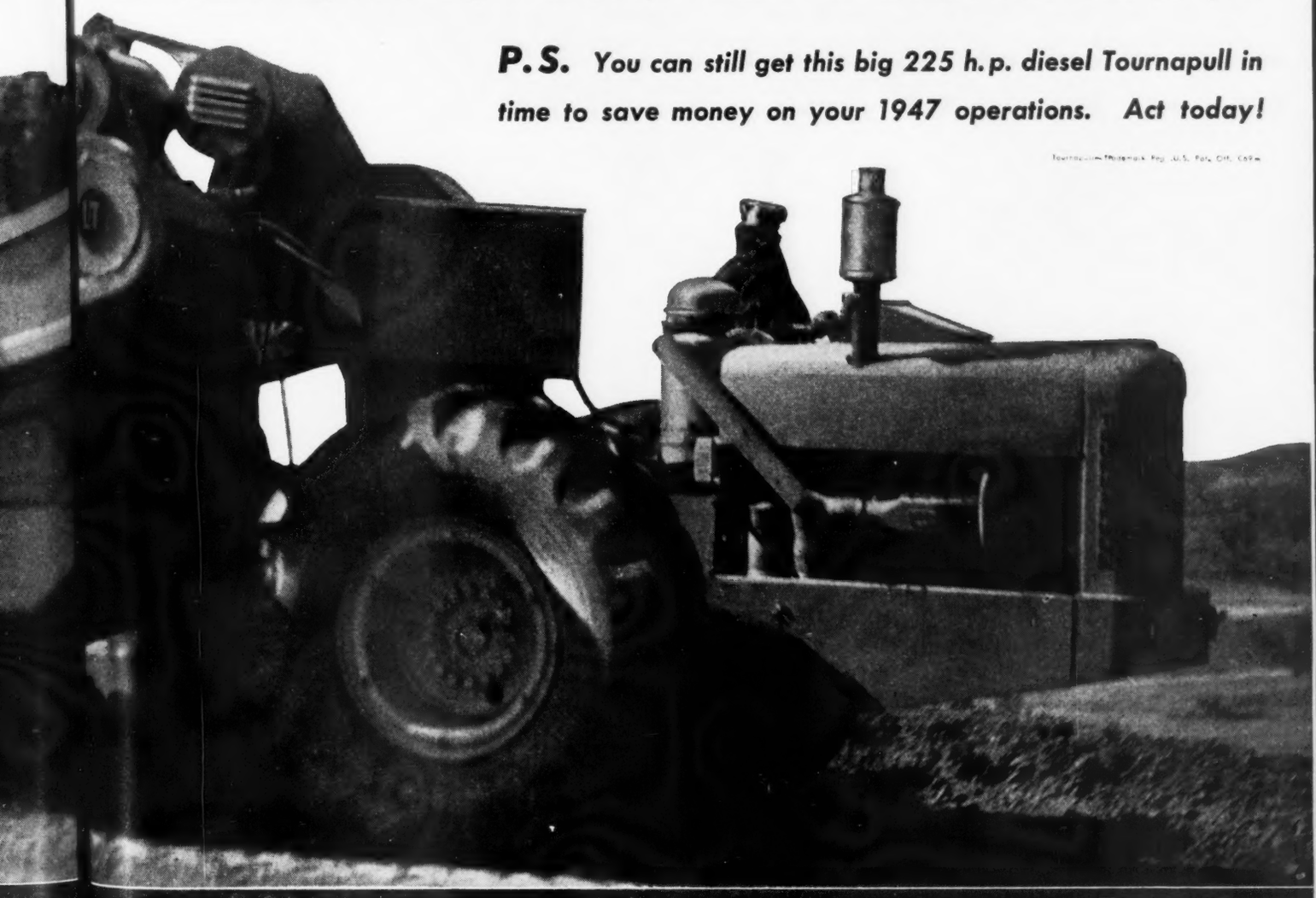
LeTOURNEAU LET EQUIPMENT

See your LeTourneau Distributor NOW for complete information on prices and delivery

three ways with "B" TOURNAPULLS

FIGURE IT THIS WAY. On large stripping or material handling jobs the new 26-yard "B" Tournapull hauls over twice the usual scraper pay load every trip . . . doubles your hauling output per man-hour . . . cuts your operating and maintenance costs practically in half. And that's only part of the story. Travel speeds up to 15 m.p.h. plus finger tip electric control . . . instantaneous shifting and braking . . . safe, easy power steering . . . all help to get more material moved faster, easier and at lower cost. In addition, because this powerful new "B" Tournapull walks right through deep mud, sand, snow and ice that would stall ordinary dirtmovers, you can start working earlier in the spring . . . keep moving dirt all season with fewer and shorter delays from weather . . . keep going later in the fall . . . cash in on more productive hours per year.

***P.S.** You can still get this big 225 h.p. diesel Tournapull in time to save money on your 1947 operations. Act today!*



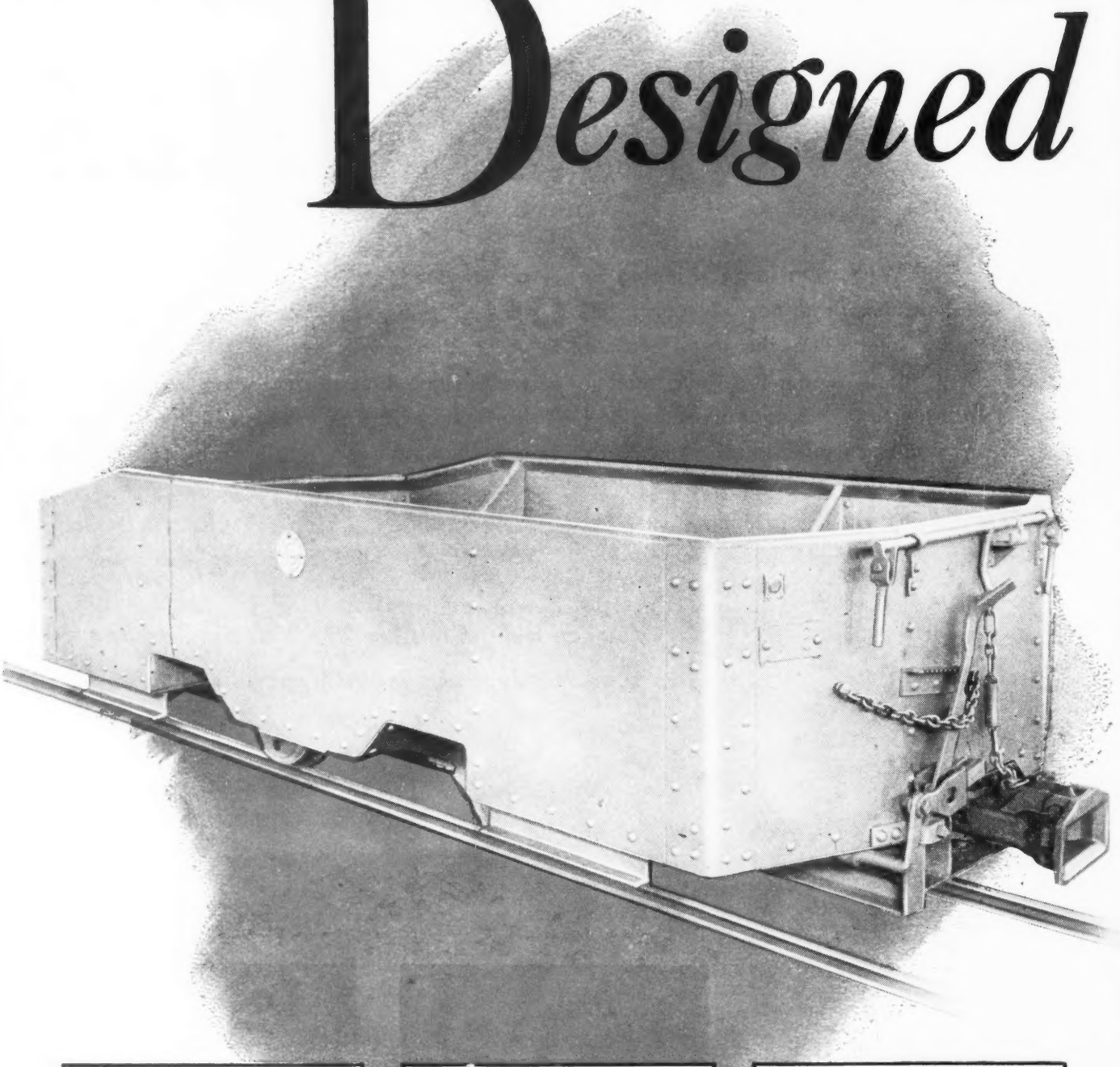
Tournapull—Trademark Reg. U.S. Pat. Off. Copr.

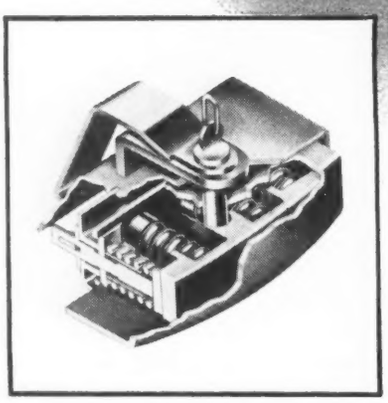
LETOURNEAU
PEORIA, ILLINOIS

EXTRA-CAPACITY

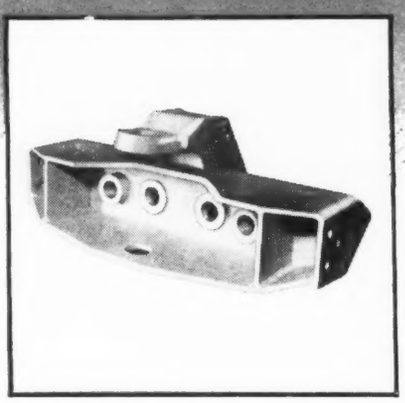
TOURNAPULLS

Designed

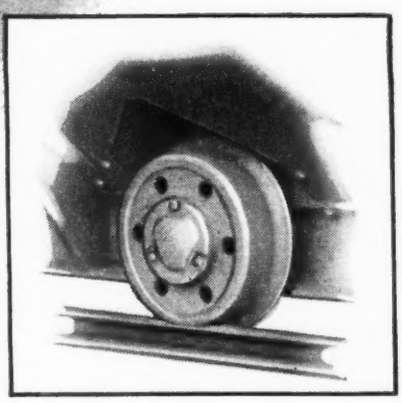




Double-Action Spring Bumpers to Absorb Shocks



All-welded End Sills to Assure Structural Rigidity



Chilled Tread Wheels with Anti-Friction Bearings for Haulage Ease and Long Life

in every detail

for years of rugged service

The transportation of coal is "rugged business". It requires strong, sturdy, well built mine cars to handle heavy loads at high speeds.

Car requirements for each mine are different. The thickness of coal seams, the method of loading and handling, the size, type and number of cars per trip vary a great deal.

For this reason, a.c.f. mine cars of all types are "designed in every detail" to do a specific job in your mine—to fit the actual operating conditions you encounter—to give maximum capacity per car.

Important to mine car design are a.c.f.'s heavy-duty, double-action spring bumpers which absorb severe draft and buffing shocks—all-welded steel end sill members which increase structural strength and prolong car life—chilled tread wheels which cause less friction on the rails and permit rapid hauling of heavy trips.

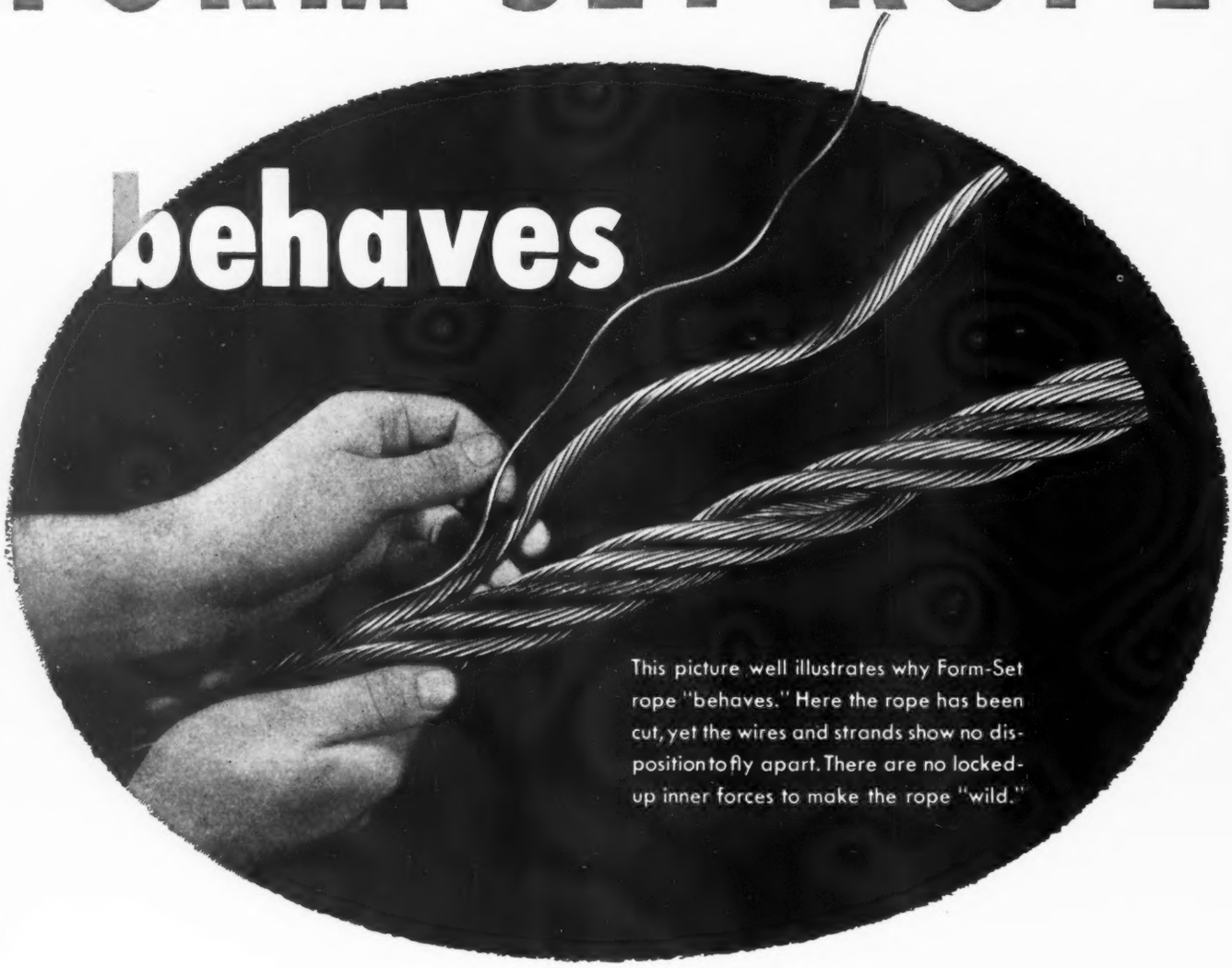
Talk over your haulage problems with our Sales Representatives. They will be glad to explain all the features of a.c.f. mine cars—features that will add years of service to your haulage equipment.

NEW YORK
CHICAGO
ST. LOUIS
CLEVELAND
WASHINGTON
PHILADELPHIA
SAN FRANCISCO
PITTSBURGH
HUNTINGTON, W. VA.
BERWICK, PA.

American Car and Foundry Co.

a.c.f. MINE CARS

BETHLEHEM FORM-SET ROPE



This picture well illustrates why Form-Set rope "behaves." Here the rope has been cut, yet the wires and strands show no disposition to fly apart. There are no locked-up inner forces to make the rope "wild."

Form-Set is easy to handle, easy to rig, easy to get along with. Isn't temperamental or finicky.

Reason: the preforming process relieves pent-up forces. Hence, Form-Set rope is *relaxed*, pliable, bendable.

This same pliability, this same relaxed character of Form-Set rope, frequently accounts for longer life. A Form-Set rope has greater resistance to bending fatigue, and is more resistant to crushing. On many types of applications its extra life means overall economy. It is especially suitable where operating ropes pass around small sheaves and drums, or are required to make reverse bends.

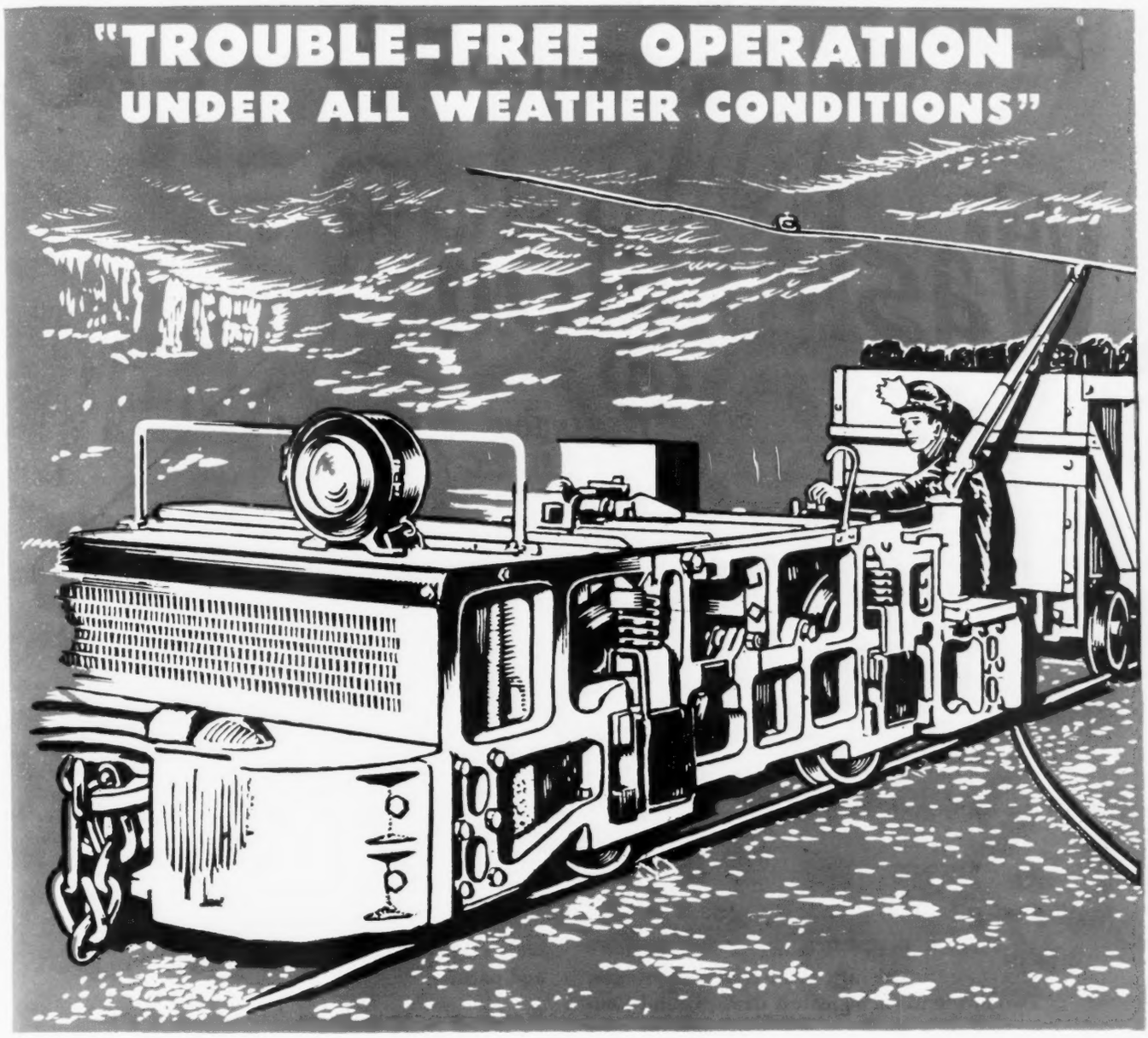
All sizes, types, and grades of Bethlehem wire rope can be had with the Form-Set construction. Ask for details. We specifically recommend Form-Set whenever we believe that it can do a better job for you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

★ BETHLEHEM STEEL ★

When you think WIRE ROPE . . . think BETHLEHEM



with Tycol Grease #19 the modern mine car lubric

TYCOL
INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C.
Pittsburgh • Philadelphia

TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE · NEW YORK 4, N. Y.

"Low temperature drag eliminated . . .
Power requirements lowered . . .
Minimum wear of bearings . . .
Leakage reduced . . .
Repair bills slashed . . ."

Yes . . . more and more mining engineers are discovering that Tycol Grease # 19 provides peak performance no matter what the atmospheric conditions . . . for this new lubricant is scientifically compounded to assure maximum results down to 0°F.—and lower.

For full details concerning the benefits of Tycol Grease #19, contact your nearest Tide Water Associated office today.

LUBRICATION—"ENGINEERED TO FIT THE JOB"

UNION PACIFIC

TREASURE MAP OF INDUSTRY

Washington *

TREMENDOUS WATER POWER
LOW ELECTRIC RATES
LEADER IN LUMBER
BASIC METALS AND ORES
LARGE AGRICULTURAL YIELD
SOURCE OF SEA FOOD
GATEWAY TO THE ORIENT
EXCELLENT TRANSPORTATION
FAST GROWING POPULATION
SCENIC WONDERLAND

* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*

WATER POWER is one of Washington's most important industrial advantages. Two of the world's greatest dams, Grand Coulee and Bonneville, make it possible to offer industry unusually low electric power rates.

Lumber, coal, iron, nickel, chrome, aluminum —and other basic metals—are available "on the ground floor" for industrial purposes.

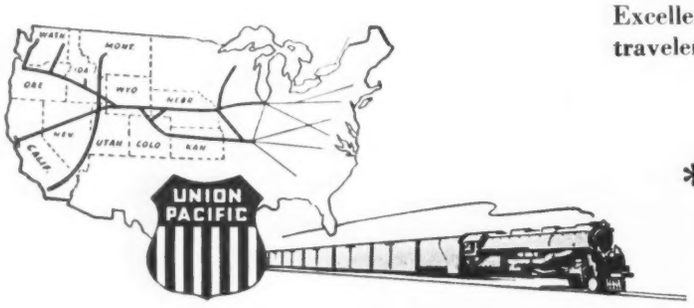
The state's tremendous yield of fruits and vegetables, together with seafood, offers an immediate supply to concerns engaged in processing and packing.

Washington's population has shown a great growth; providing a large local consumer market and source of industrial workers.

The state also is a gateway to the Orient for export business.

From a viewpoint of good living, the Evergreen State offers a year 'round scenic playground . . . excellent educational and cultural advantages.

Excellent rail transportation, for shippers and travelers, is provided by Union Pacific.



* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.*

UNION PACIFIC RAILROAD

THE STRATEGIC MIDDLE ROUTE

ALLIS-CHALMERS HD-5

NEW THROUGHOUT

COMPLETELY NEW IN DESIGN
37.5 Drawbar Hp.
Weight,
Approximately 11,000 lbs.
2-Cycle
GM Diesel Power

NEW PERFORMANCE...NEW WORK CAPACITY...NEW SIMPLIFIED SERVICING

Instant starting.

Quick pick-up.

Fast maneuvering.

Comfortable operation.

Rugged and dependable.

Increased lugging ability because of built-in characteristics of General Motors 2-Cycle Diesel engine.

More footing and greater traction to handle larger loads under a wider range of conditions.

Tractor weight balanced for most efficient drawbar and front-mounted equipment use.

Tractor construction permits separate and convenient removal of major assemblies.

Greasing intervals lengthened—1,000 hours for truck wheels, front idlers and support rollers.

Lubrication fittings reduced in number and made readily accessible.

Adjustments easily reached and quickly made.

Get the full story of this great, new diesel tractor from your Allis-Chalmers dealer.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

GOODMAN UNDERGROUND

Any Length

•

Any Capacity

BELT CONVEYORS

17107

Write for copy of Bulletin C-411

GOODMAN MANUFACTURING COMPANY
CHICAGO 9, ILLINOIS

BUILDING
SITE FOR RENT
TO THE
RIVER

What! Waterless power?

HITHERTO large power production has always required water. Water for dams and waterfalls. Water for boilers, condensers. Water for cooling oil engines, gas engines. Even power from the atom will need water, lots of it.

More Freedom and Economy for Industry

Now comes the new coal-burning gas-turbine being developed under direction of the research organization sponsored by seven coal-carrying railroads and the coal industry. This amazing unit will need no water.

That means more freedom to locate an industrial plant wherever it is needed—untrammeled by any power need to be near water. It is confidently expected, too, that with this new coal-burning gas-turbine, power will be produced more cheaply than ever before. Thus basic requirements for wider dispersal of American industry will be met, to great national economic and defensive advantage.

One of Many Phases of C&O Service

The Chesapeake & Ohio Railway is a substantial contributor toward the financial support of this project and other coal research activities. Its policies, organization and facilities are shaped and directed for the better service of coal, and users of coal.

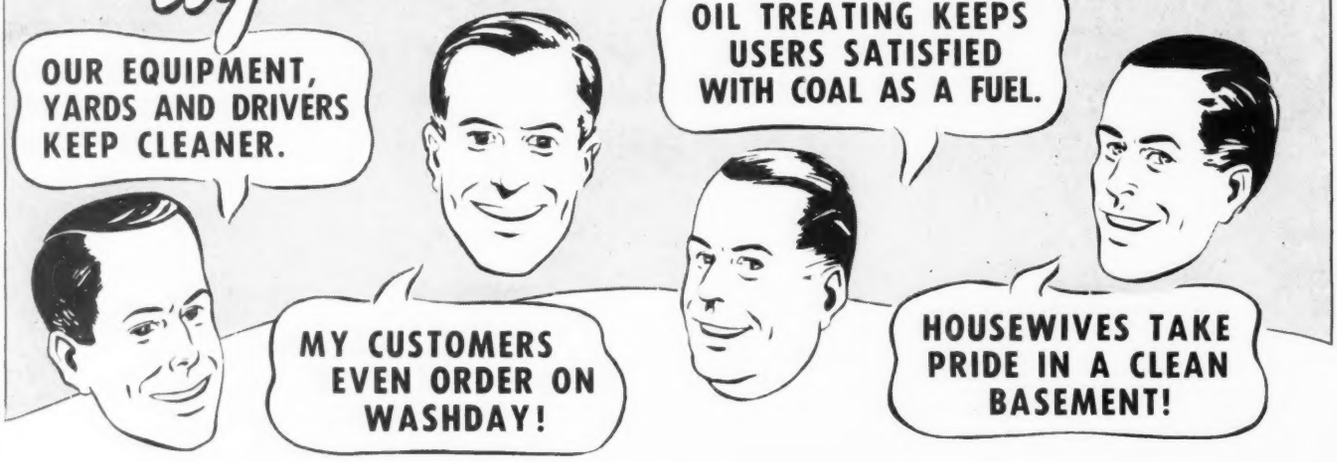
C&O Moves the Coal

C&O matches the producing capacity of the mines with huge capacity for moving the coal. For this purpose the C&O maintains a supply of coal cars that is more than *ten times* its daily average loading.

Chesapeake & Ohio Railway

Keep the industrial plants burning coal

Dealers agree! OIL TREATING IS A "MUST" IN COAL MERCHANDISING


OUR EQUIPMENT, YARDS AND DRIVERS KEEP CLEANER.
OIL TREATING KEEPS USERS SATISFIED WITH COAL AS A FUEL.
MY CUSTOMERS EVEN ORDER ON WASHDAY!
HOUSEWIVES TAKE PRIDE IN A CLEAN BASEMENT!

Ashland PERMATREAT COAL SPRAY

seals in dust

CREATES CUSTOMER SATISFACTION . . . INSURES CLEANER HANDLING

Dealers agree too that oil treating is the most important step in preparing coal to insure its continued use as a domestic fuel. This is particularly true in soft-structured coals. It pays dividends in satisfied customers.

Let us tell you more about PERMATREAT Coal Spray and how it can help you sell and hold more coal customers. Write Ashland today.

ASHLAND PERMATREAT:

- DUSTPROOFS
- HAS PERMANENT EFFECT
- IS ODORLESS TREATMENT
- FREEZEPROOFS
- CUTS WINDAGE LOSS
- GIVES BETTER STOKER FEED
- HAS NO CORROSIVE ACTION
- IS EASILY ACCESSIBLE
- HELPS SALES

Ashland PERMATREAT COAL SPRAY

ASHLAND OIL & REFINING COMPANY

ASHLAND, KENTUCKY

ECONOMICAL SHIPPING RANGE

BROADEN YOUR PROFITABLE MARKET WITH CARDOX

"THE NON-EXPLOSIVE MINING METHOD"

CARDOX-mined coal is commonly shipped to markets far beyond the safe shipping range of "explosion shattered" coal from the same region. The gentle heaving action of CARDOX does not produce shattercracks. It breaks down the coal in solid firm chunks that resist degradation—retains its premium size—through long shipments and rough handling in dealers' yards.

Write for full details on free demonstration of CARDOX production economies and marketing advantages.

CARDOX CORPORATION Bell Building • Chicago 1, Illinois

Only the SIDE of a V-Belt TOUCHES the Pulley

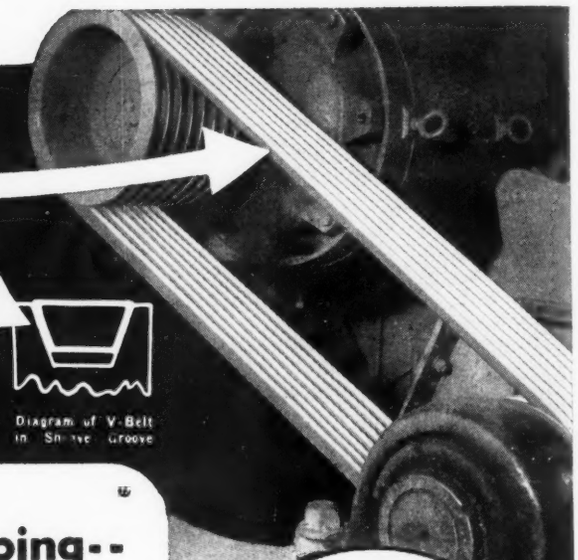


Diagram of V-Belt in Sheave Groove

The SIDE Does ALL the Gripping--
----Naturally it GETS the WEAR!

Every ounce of load a V-Belt *carries* must first be picked up by the sides of the belt. Clearly so, because *only* the *sides* touch the pulley! The sides do all the GRIPPING—they get all the WEAR against the sheave-groove wall. The sides pick up the load. They transmit that load to the belt as a whole. And then, once more, the sides—and the sides alone—grip the driven pulley and deliver the power to it.

No wonder you have always noticed that the sidewall of the *ordinary* belt is the part that *WEARS OUT FIRST.*

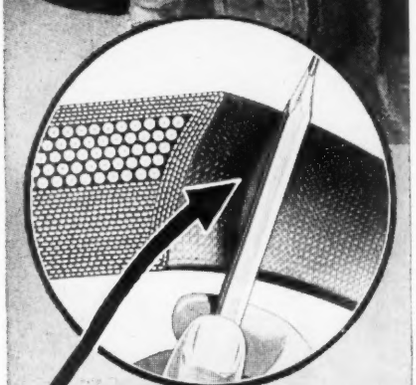
Now See How the Patented CONCAVE SIDE ★ SAVES Sidewall Wear and Lengthens Belt Life!

Naturally, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the *middle* of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belt can possibly give.

★Longer Sidewall Wear is MORE IMPORTANT NOW Than Ever Before!

Now that Gates *SPECIALIZED* Research has resulted in Super V-Belts capable of carrying much heavier loads—up to 40% *higher horsepower ratings* in some cases—the sidewall of the belt is called upon to do even more work in transmitting these heavier loads to the pulley. Naturally, with heavier loading on the sidewall, the life-prolonging Concave Side is more important NOW than ever before!



The CONCAVE SIDE is a GATES PATENT

Straight Sided V-Belt

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley.

No bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

478

THE GATES RUBBER COMPANY, DENVER, U. S. A. "World's Largest Maker of V-Belts"

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

Gates

REG. U. S. PAT. OFF.

THE MARK OF SPECIALIZED RESEARCH

What becomes of them?

Last night another trainload of "Caterpillar" products rolled out of the yards. With the factory's peacetime production at an all-time high, such scenes are of daily occurrence.

So, you ask, why the "scarcity"? . . . What becomes of all these thousands of Diesel-powered tractors, engines, motor graders and units of earth-moving equipment?

That's a fair question. Especially if you are a customer who has been patiently awaiting delivery on an order. Here is the answer:

"Caterpillar" products have gained unprecedented demand that takes time to supply. It is a demand that has been built up through sheer excellence of quality . . . through tireless engineering research and job study that have made them better and better . . . through their illustrious war record and their versatility for serving many industries.

In fact, "Caterpillar" power has become woven into the very fabric of our economy and progress. Big-scale utility, reclamation and conservation projects could scarcely proceed without it. Agriculture needs it. Logging demands it. It is a "must" on highway construction and maintenance.

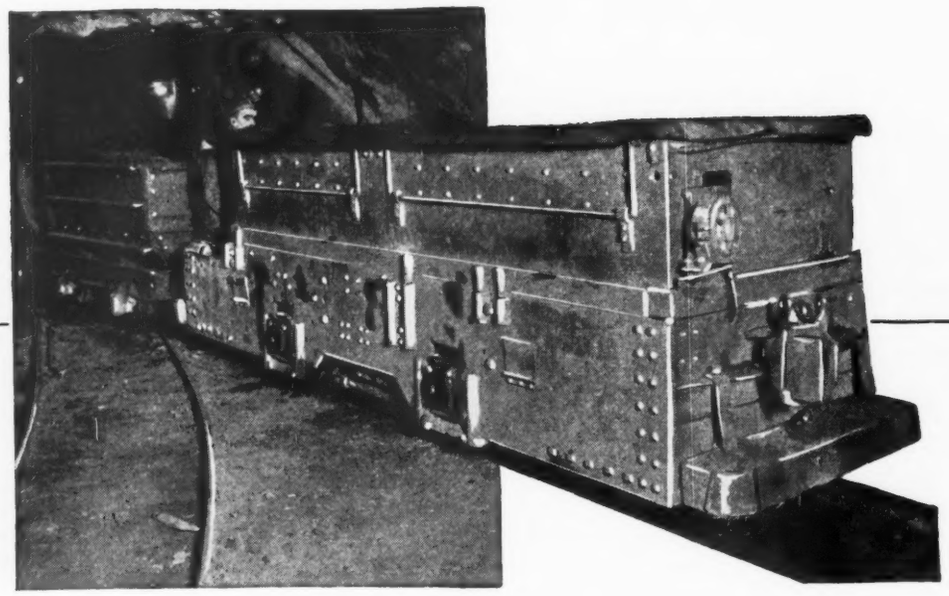
Mining, excavating, quarrying, oil drilling, community lighting, fishing, hatcheries, milling, cotton-ginning, machine shops, switching locomotives, factories—all find "Caterpillar" power a key to a successful public service.

So, you see, the "world of 'Caterpillar' Diesels" is a big one. The needs that "Caterpillar" must supply are many. The destinations of every trainload of "Caterpillar" products are widely scattered.

To allocate the factory's output is no small problem. Apportionment is fair — by regions and by industries. Priority of orders is the reasonable basis for customer deliveries. "Caterpillar" subscribes firmly to that principle. So do "Caterpillar" dealers, whose responsibility it is to carry it out. Each is a businessman of ability and integrity, who merits the confidence of his customers and his company.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

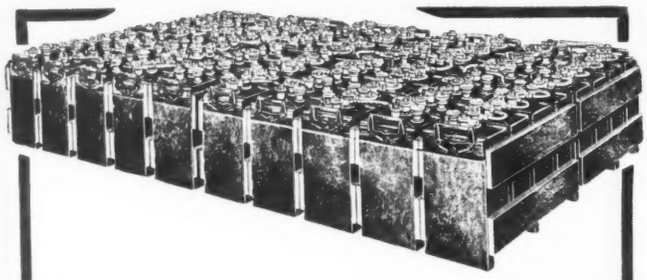
CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT



Do you get...

EXTRA SERVICE from "retired" Batteries?

After an EDISON Nickel-Iron-Alkaline Battery has delivered its normal service life in a locomotive or shuttle car and has to be replaced because the battery is no longer of sufficient capacity for the work, its cells, instead of being scrapped, are often regrouped into other batteries for lighter-duty uses for which their capacity is still ample.



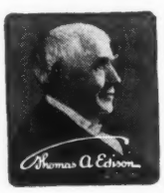
In Mine Locomotive and Shuttle Cars EDISON Nickel-Iron-Alkaline Batteries Give You These Important Advantages

- ★ They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- ★ They are **foolproof electrically;** are not injured by short-circuiting, reverse charging or similar accidents; are free from self-deteriorating reactions.
- ★ They can be **charged rapidly;** do not require critical adjustment of charge rates; can be charged directly from mine d-c supply.
- ★ They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling.
- ★ They can **stand idle indefinitely** without injury. Merely discharge, short circuit, and store in a clean, dry place.
- ★ They are **simple and easy to maintain.**

FREE ADDITIONAL POWER ——

The electrical departments of a number of mines have been doing just that; in effect getting new batteries free which, in various stand-by jobs, often give many more years of dependable performance. The fact that nickel-iron-alkaline batteries can do this is a good illustration of their unequalled dependability on the original job.

The reasons are few and simple: steel cell construction; an alkaline electrolyte that is a natural preservative of steel; a principle of operation free from self-destructive reactions. Because of their long life, simple maintenance, and trouble-free characteristics, EDISON Nickel-Iron-Alkaline Batteries also help cut haulage costs. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. In Canada: International Equipment Company, Limited, Montreal and Toronto.*



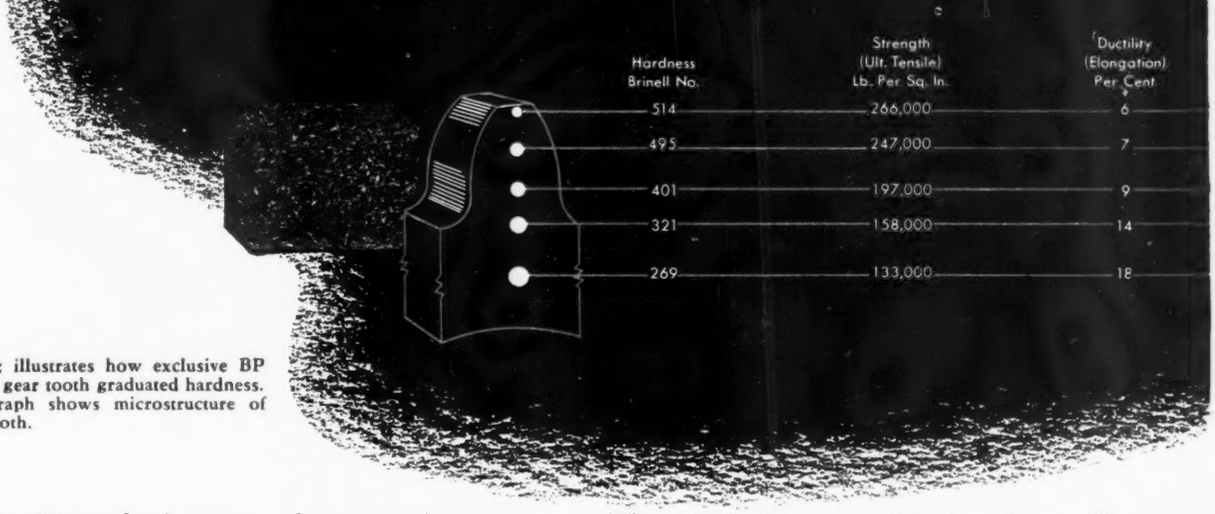
EDISON

Nickel • Iron • Alkaline

STORAGE BATTERIES

in these *two* spots...

...watch these *five* spots



Line drawing illustrates how exclusive BP process gives gear tooth graduated hardness. Microphotograph shows microstructure of BP-treated tooth.

You'll get far better performance in your mine locomotive gear drives if you check closely the five points of gear hardness shown in the diagram.

For the diagram shows how the exclusive BP treatment produces a gear which has just the right degree of surface hardness to resist wear, yet is backed up by a tough ductile structure to resist severe shock loads.

The result is a gear hardened specifically for mine locomotive service . . . with strength, toughness and high resistance to abrasion.

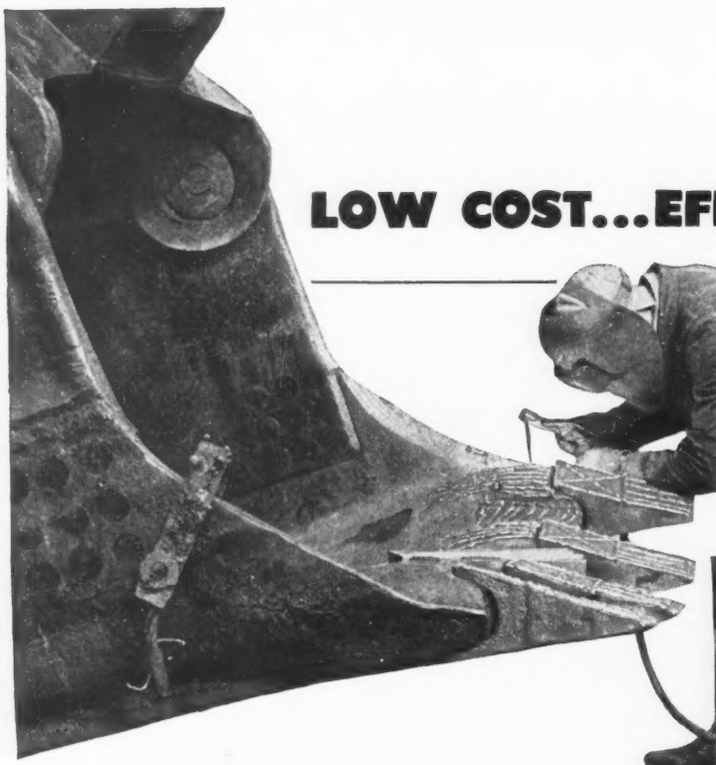
Ask your nearest Westinghouse office for the whole story of BP heat-treated gears and how they contribute to greater operating economy. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-07255

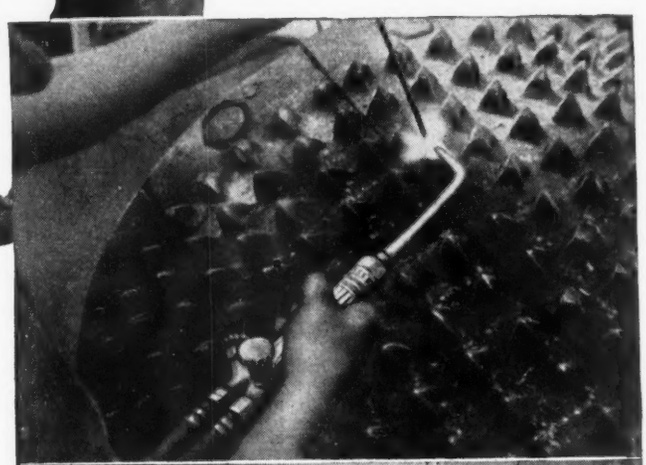
Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

BP *Gears*

LOW COST...EFFICIENT MAINTENANCE





of Wearing Parts by Hardfacing

Worn mining machinery and equipment need no longer mean costly replacement. Today, coal men have found that rebuilding worn surfaces with the oxyacetylene flame or electric arc using Stoody Hardfacing Alloys renews the life of their equipment, and in many cases, improves the operating characteristics.

For example, they have found that hardfaced shovel teeth last two to six times longer than untreated teeth. Also, as one company reported, by building up worn crusher teeth they saved 75% of the replacement cost of a new segment — which, in turn, was a tremendous saving over the cost of the entire crusher.

But this is just one of the many profitable Airco oxyacetylene flame and electric arc applications in and around the mines. Others include gas cutting steel plate for fabricating screens, slate buckets, and other equipment . . . welding of rail ends to form one continuous rail . . . flame hardening . . . and numerous repair jobs.

For further information about these cost-cutting, time-saving processes write for the explanatory article — "Welding, Flame Cutting For Efficient Maintenance and Low Cost". Address: Air Reduction, 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas. Represented Internationally by Airco Export Corporation.

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Rome 60

DRILL CORD

IS SAFE

BECAUSE...

1 It is jacketed with tough, *flame-resistant* Neoprene.*

2 Recommended three-conductor construction provides a safety grounding conductor.**

3 The reinforced Rome 60 jacket of Neoprene resists mechanical shock, abrasion, and is unaffected by immersion in acidulous mine waters.***

Meets State of Pennsylvania and Federal flame test requirements by wide margin.

Provides grounding features in accordance with all requirements of the new Mine Safety Code in addition to clear-cut polarity identification.

Also resistant to oils, alkalies, corrosive vapors and surface checking.

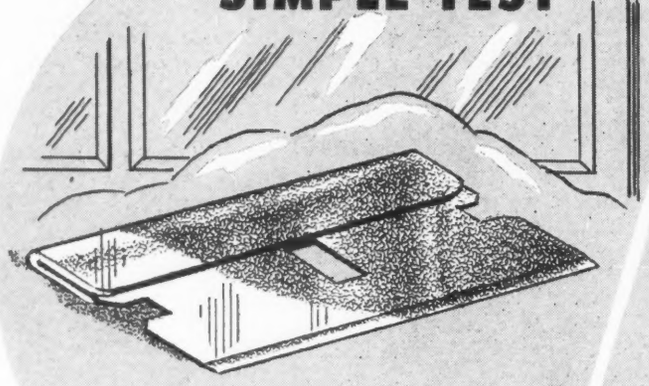
FROM BAR TO FINISHED WIRE

ROME CABLE CORPORATION

ROME • NEW YORK

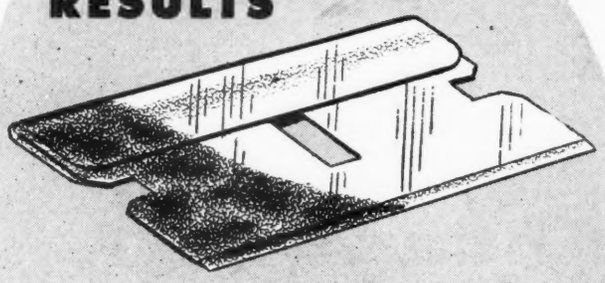
How to PREVENT Corrosion

MAKE THIS SIMPLE TEST



Coat a section of an old razor blade or any piece of raw metal with a protective film of Anti-Corrode. Place it out-of-doors, and leave exposed to the elements.

SEE THE AMAZING RESULTS



Rain, snow, changing temperature, dust and grime have eaten into and oxidized the unprotected metal. But note surface under Anti-Corrode film-bright and unharmed, in its original state.

Cities Service Anti-Corrodes are safe rust and corrosion preventives that bring amazing results. They are reliable safeguards against corrosion of metals in any form or state of finish—whether in storage or in transit. These Anti-Corrodes form a tenacious, durable film that is impervious to moisture and the more common gases prevalent in the atmosphere. And, since they contain lubricating material, they need not be removed in drawing operations. These Anti-Corrodes are made in several types to meet a wide range of service conditions. They are economical, easy to apply and can be removed with kerosene or any petroleum solvent.

(Available only in Cities Service marketing territories EAST of the Rockies.)
Available in one gallon sizes only.

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Gentlemen: I would like further information on Anti-Corrode and Rust Remover for industrial use FREE OF CHARGE.

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This TEAM will save you MONEY and MATERIALS

Recently, we announced the development of Cities Service Rust Remover, and the response to our demonstration offer far exceeded expectations. Rust Remover, of course, *removes* rust. Anti-Corrode is designed to *prevent* rust and corrosion. Together, they will safeguard your equipment and production!

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Firestone
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She Takes The Weight Off Her Brain!

FAMOUS U.S. ISSUED PATENTS

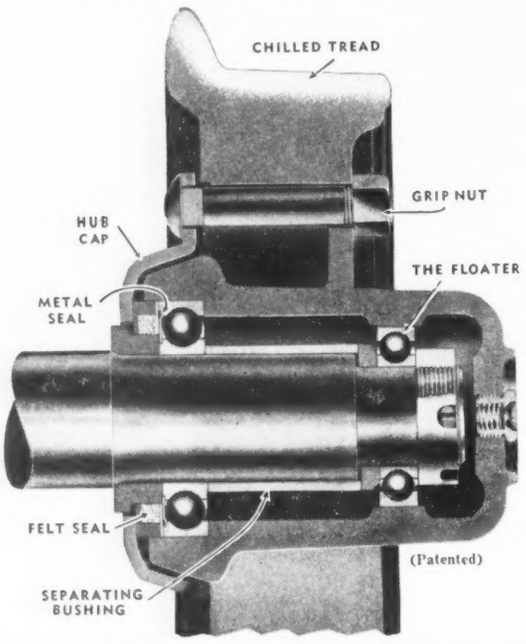
NO. 7 OF A SERIES

THE HAT

No. 1,045,060 Patented Nov. 19, 1912

". . . The objects of the invention are, to provide a hat which will permit of free circulation of air entirely around and over the head of the wearer, thus to prevent headaches caused by the weight and close fitting of the ordinary hat; to allow free movements of the head of the wearer independently of the hat; to afford unobstructed exhibition of the ornamentation and trimming of the wearer's hair and of the hat; to remove all weight from the head and transfer it to the shoulders of the user; . . ."

(Language inside quote marks taken directly from U. S. Patent.)



50% INCREASE IN LOADS HAULED WITH S-D "FLOATER" WHEELS

S-D "Floater" Ball Bearing Wheels run oh so easily! Tests prove that a locomotive can pull about 50 per cent more coal per trip and about 10 per cent faster than where cars are equipped with other types of anti-friction bearings. Grease them once in 5 years! They are also guaranteed against breakage or bearing failures for 5 years. Big and little cars are equipped with S-D "Floater" Ball Bearing Wheels. Each truck saves at least $5.00 per year of use in electricity alone. More than 80 per cent of our customers use them.

Men With Weighty Brains Use S-D 1-2-3 "Automatics"

The car on the opposite page has a 56½ inch track gauge. It is approximately 9 ft. wide, has sides 18 ft. 7 in. long, and is 42 in. high. It will haul about 12 tons of coal each trip.

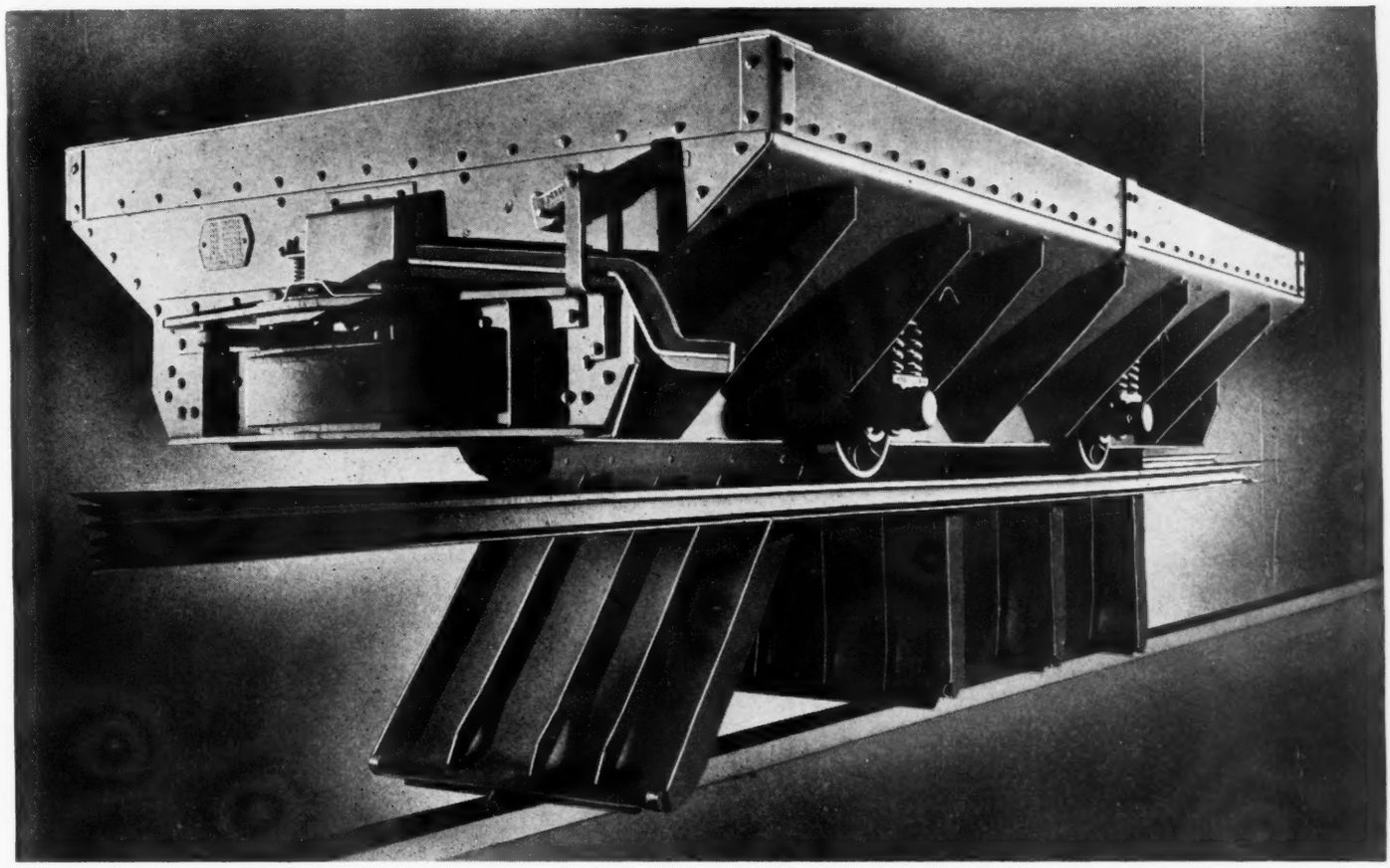
Forty of these "Automatics" were delivered to a new mine run by men who know how S-D 1-2-3 "Automatic" cut the cost of producing coal. The saving runs from 25c to 55c per ton handled. No car can equal the efficiency of S-D "Automatics." Many mines have thrown away rotary and end-dump cars and have installed a complete new outfit of our "Automatics."

S-D Automatics are made from 1 to 40 ton capacity, 4-wheel and 8-wheel cars. They are rugged and strong, life usually 15 to 20 years. Automatics are not stood on their ends, or rolled over sidewise. Indeed they are seldom uncoupled. Fifty or more tons of coal dumped

20 Car loads of "Automatics" from—

SANFORD-DAY IRON WORKS, Inc. • Knoxville 9, Tenn.

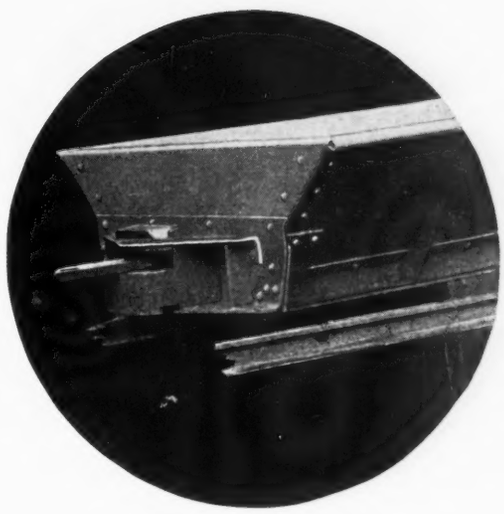
CARS AND BRAINS



per minute Automatically: No crew of men at tip house.

Now, Listen to This . . .

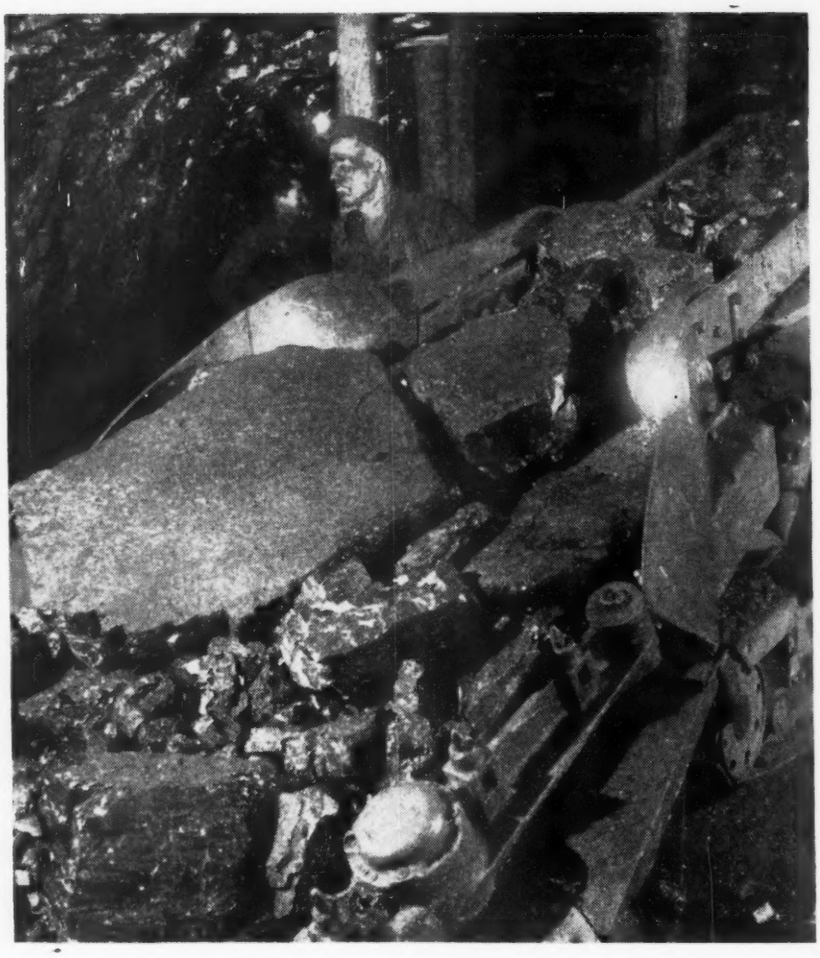
As you see, the car above was equipped with the conventional latch lever bar and other dumping mechanism on the end of car, but this was four years ago. We have now designed a new method of unlatching cars. The ends of our cars are now like the one shown in the circle. No latch lever bars sticking out sidewise to get bent and to give you trouble. The doors are now unlatched from underneath the bottom. Two latch hooks are used, one is for extra safety and extra support. Operators say that this is perhaps the most important improvement in "Automatics" since our first ones in 1917. Remember, we lease "Automatics" to those who prefer this way. Average cost over 15 years about 2c per ton of coal handle—with free repairs. How about that?



20 Car loads of "Automatics" from—

SANFORD-DAY IRON WORKS, Inc. • Knoxville 9, Tenn.

For Safety, Service and Tonnage



Use ROCKBESTOS A.V.C.

With today's emphasis on safety — you can get maximum protection against fire and explosion *plus* long, economical service when you wire cutters, loaders and locomotives with Rockbestos A.V.C. Mining Cable. Its impregnated asbestos insulation and braid won't burn because they are made of a fireproof mineral that doesn't ignite or feed traveling wire-fires.

By keeping your equipment *working* instead of *loafing* in the repair shop, Rockbestos A.V.C. keeps tonnage rolling out and holds production costs down. And its high resistance to the scorching heat of hot grids, baking conductor overloads, grease, oil and moisture not only prevents failure, but also cuts electrical maintenance expense to bedrock.

For safety and more tonnage use Rockbestos A.V.C. for coil connections, motor leads and connections from grids to controllers when re-wiring. Specify it in new and rebuilt equipment. Write for Bulletin 30-C and a sample of the cable.

ROCKBESTOS PRODUCTS CORP., Dept. M-6, Box 1102, New Haven 4, Conn.

SIX GOOD REASONS WHY THE ORIGINAL ROCKBESTOS A.V.C. STANDS OUT AND STANDS UP

- The impregnated asbestos yarn braid is heatproof, flameproof and resistant to moisture, oil, grease and alkalies.
- The felted asbestos insulation beneath, impregnated with heat, flame and moisture resisting compounds like the braid, won't bake out, crack, flow or burn.
- Asbestos-protected varnished cambric supplies high dielectric strength and added moisture resistance.
- The inner impregnated asbestos insulating wall won't get brittle or crack under conductor-heating overloads and won't burn even if the copper melts.
- The paper separator prevents the insulation from sticking to the conductor and makes stripping easy.
- It is made to fit bushings properly.

This construction is one of 125 developed by Rockbestos for severe operating conditions.

ROCKBESTOS A.V.C.

The Cable with Permanent Insulation

ORDER FROM THESE JOBBERS—SPECIFY "ROCKBESTOS A.V.C."

BECKLEY, W. VA.:	Beckley Mach. & Elec. Co.	EVANSVILLE, IND.:	Evansville Elec. & Mfg. Co.	PITTSBURGH, PA.:	Upson-Walton Co.
BIRMINGHAM, ALA.:	Moore-Handley Hdwe. Co.	FAIRMONT, W. VA.:	Fairmont Supply Co.		Westinghouse Elec. Supply Co.
BLUEFIELD, W. VA.:	Superior-Sterling Co.	HUNTINGTON, W. VA.:	Banks-Miller Supply Co.	SCRANTON, PA.:	Penn. Elec. Engineering Co.
CHARLESTON, W. VA.:	Charleston Elec. Supply Co.	LOTHAIR, KY.:	Mine Service Co.	WHEELING, W. VA.:	Westinghouse Elec. Supply Co.
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Increased tonnage of properly sized material . . . along with maximum control of placement . . . are just two of the benefits you can count on when you use AMERICAN explosives. Available in a complete range of strengths, velocities and densities, AMERICAN explosives are designed to meet efficiently any field problem.

And the intensive research, quality control and modern manufacturing techniques behind all AMERICAN explosives and blasting supplies are your assurance of maximum dependability, safety, speed and all-around economy under any conditions. Whatever your requirement, there is an AMERICAN explosive to meet it.

• *Capable field engineers are available at your call*

• HIGH EXPLOSIVES • PERMISSIBLES

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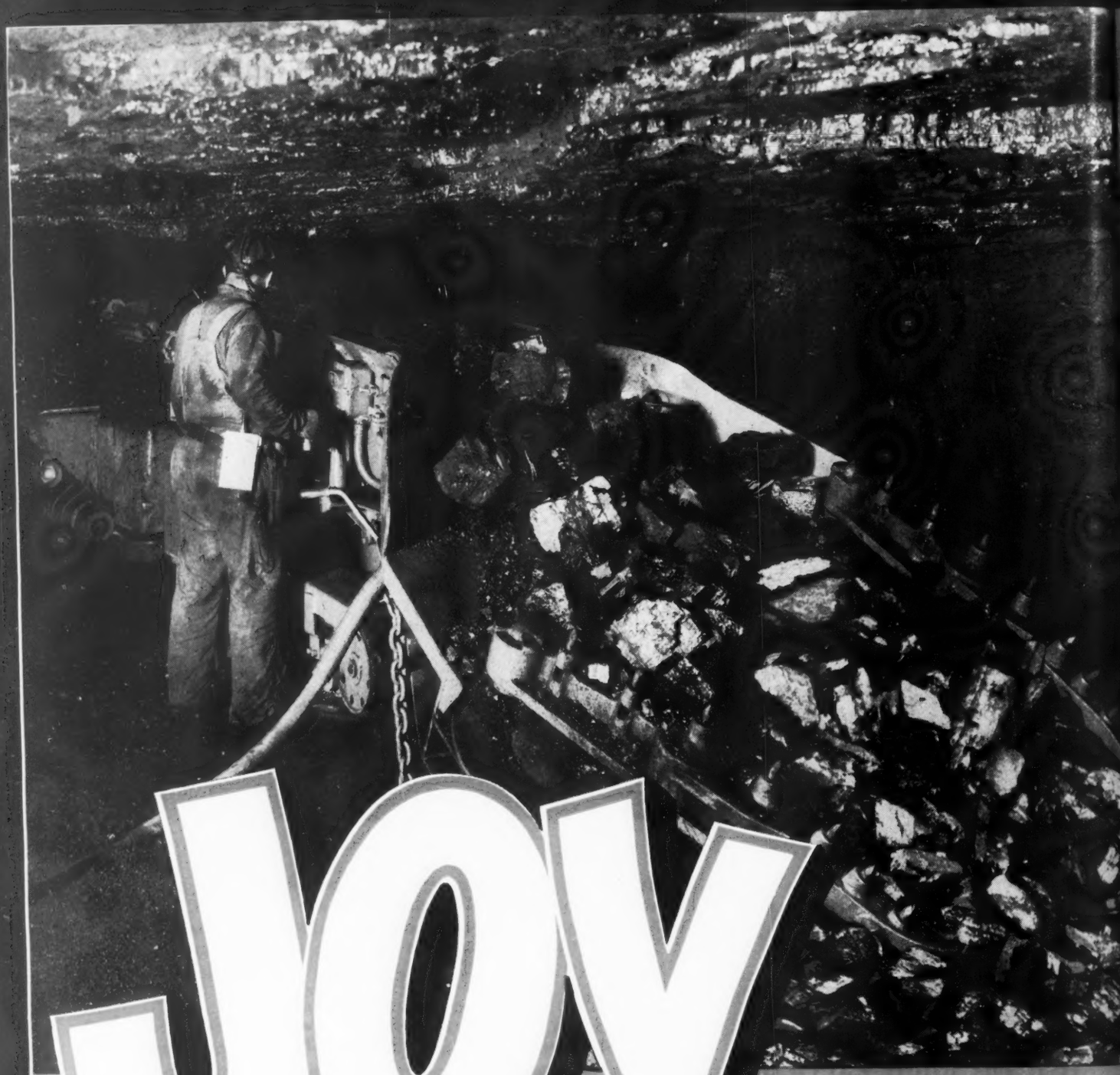

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SEND RECORDS SOARING...

REDUCE COSTS...

INCREASE TONNAGE...

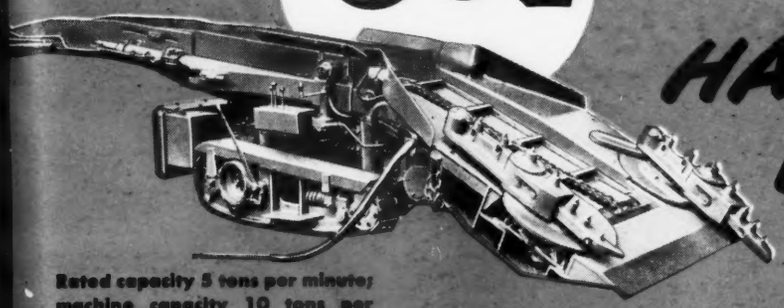
OPERATE ECONOMICALLY...

HAVE LOW MAINTENANCE...

Consult a Joy Engineer

JOY 11-BU LOADER

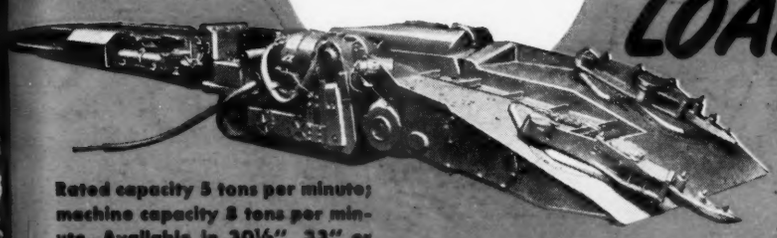
HANDLES UP TO 10 TONS PER MINUTE IN HIGH SEAMS



Rated capacity 5 tons per minute; machine capacity 10 tons per minute. Sturdily constructed for heavy duty work in seams averaging 60" or more in thickness.

JOY 14-BU LOADER

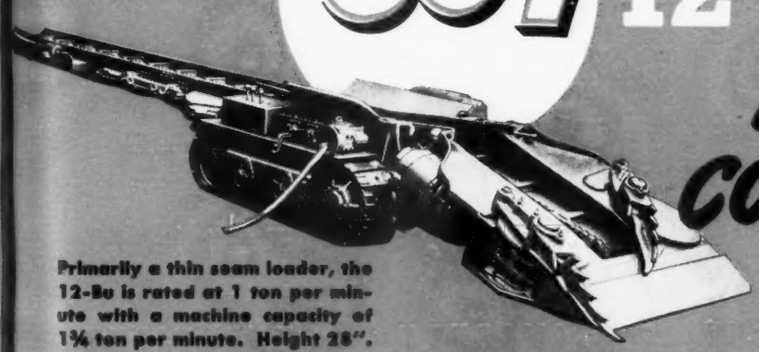
LOADS AS HIGH AS 8 TONS PER MINUTE IN LOW SEAMS



Rated capacity 5 tons per minute; machine capacity 8 tons per minute. Available in 30½", 33" or 36" heights. Individual motors drive gathering arms.

JOY 12-BU LOADER

IS IDEAL FOR CONVEYOR MINING



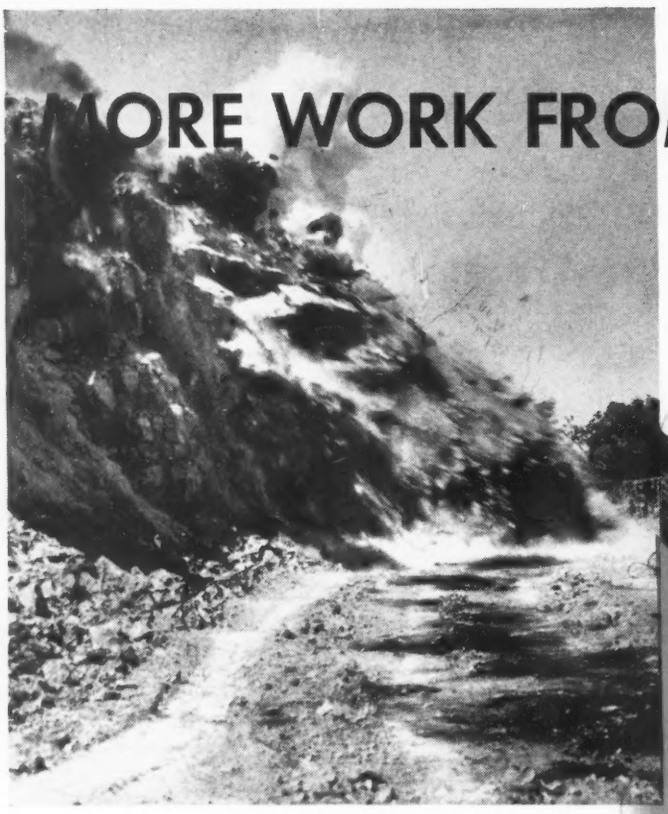
Primarily a thin seam loader, the 12-Bu is rated at 1 ton per minute with a machine capacity of 1¼ ton per minute. Height 28".

W60 CL 131

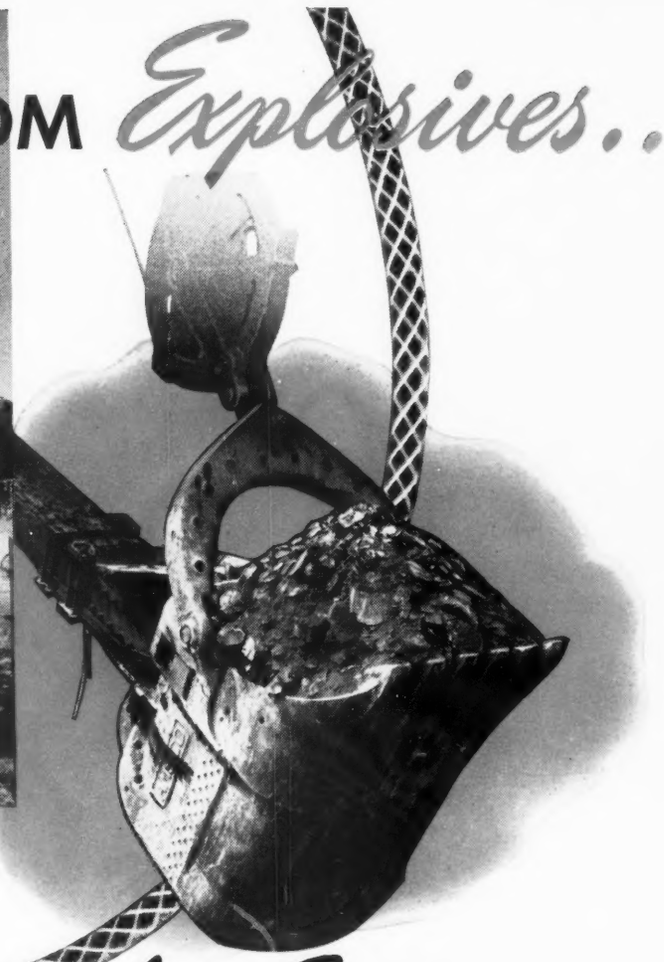
JOY DIVISION

JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH 22, PA.



MORE WORK FROM *Explosives..*



. . . LESS WORK *for Strippers*

Every PRIMACORD-fired shot—no matter how large or small—gets *more* work from the explosives . . . and *less* work for your men. Acting as the detonator, PRIMACORD explodes every cartridge in every hole with the *extra* force of a primer cartridge. Yet its detonating wave, while almost instantaneous, allows a fractional time delay between holes and rows of holes sufficient to relieve burden. Result: You can plan shots to give you better fragmentation, faster digging and loading.

This efficient use of explosives is particularly important in stripping because shots can be fired when desired, preventing down-time of expensive equipment. You will also be interested in the way PRIMACORD reduces hazards. Caps never go into a hole, and you never attach the initiating cap to the trunk line until you're all set to fire.

Hook up with PRIMACORD. You'll make stripping operations simpler and more profitable from hole-loading to truck-loading.

THE ENSIGN-BICKFORD COMPANY · SIMSBURY, CONNECTICUT

PRIMACORD-BICKFORD

Detonating FUSE

SP-34

Also
ENSIGN-BICKFORD
SAFETY FUSE
Since 1836

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

AUGUST, 1947

Ivan A. Given, EDITOR

Half Contracts

THE END OF SEIZURE and the signing of a "contract" between the bituminous operators and John Lewis gives the industry and the country a chance to devote a little more attention to cutting cost and bringing up the level of production. But the terms of the agreement, not to mention the evident application of monopoly power in its "negotiation," has left considerable cause for more than the usual dissatisfaction. Not only did monopoly power rule out the usual give-and-take that provides an opportunity for giving required weight to the views of both parties, it resulted in a situation under which production can be stopped at any time without violating the terms of the contract.

The fact that neither the industry nor the public is protected against work stoppages and that the industry is given no firm assurance of even a short period in which to try to offset the effects of (a) sharp increases in wage and other costs; (b) major changes in operating procedure; and (c) adverse public reaction to price increases and interruptions in supply, has led many operators to regard the future with added misgivings. One, for example, puts it as follows:

"I believe the cost of producing coal under the new U.M.W.A. contract will have the effect of pricing coal out of the competitive fuel market under normal conditions. The immediate result will be the closing of many marginal mines and displacement of thousands of coal miners. To establish stability in the industry, the right of the employer to bargain collectively with his own employees must be re-established and concentration of power as a result of national bargaining abolished. Limitation in production in strip mining will have the effect of substantially increasing costs on account of high relationship of fixed costs, due to complete mechanization, to variable costs, including labor. Fully expect to see safety record greatly impaired because of inability of smaller companies and marginal mines to earn sufficient funds to pay for standard safety facilities now common to the industry. It takes money to operate a safe mine, which will not be available due to high costs related to competitive fuels."

Coal mining has gone through several phases in its attempts to reach fair and equitable arrangements with employees and—lately—union leadership. Since 1933 it has changed from a predominantly non-union no-contract basis to one of practically complete unionization, and has gone from firm agreements for definite periods with equal responsibility on both sides, through government intervention and seizure with progressive relaxation of union obligations, into the present "half-contract" stage with the operators completely bound and the union completely free of responsibility for making agreements work.

If increased stability and greater cooperation had been the results, the change in contractual relations would not be a cause for undue concern. The trend, however, has been in the opposite direction and has grown more pronounced in late years. The present contracts are "half contracts" solely because Lewis wanted them that way and was able to back up his demand with complete monopoly power gained through governmental assistance and support.

In insisting on such agreements, Lewis must also assume, with his government supporters, the responsibility for seeing that production continues. In yielding, under monopoly pressure, their share of that responsibility—for the time being, t least—the operators have gone about as far as they can in conforming with union-leadership and governmental insistence that the road to better labor relations is surrender to union monopoly. If this final sacrifice, made in the public interest and as a final test of union and government policy, is followed by continued failure to make protection and preservation of employee, industry and public interest the first consideration, it will be time to consider a new course and put it into effect.

Press Association

NO PICKETING for coal miners—monopoly makes it unnecessary.

The Coal Contracts: Labor-Monopoly Products

One-Sided Bargaining Power and Continued Collusion Between the Administration and Union Leadership Reflected in the 1947 Contracts—Industry's Big Job Still One of Educating Public and Miner

THE COAL "CONTRACTS" of 1947 throw additional light on the extent of the monopoly power wielded by union leaders. They exercise that power by virtue of a policy that found legislative expression in the Wagner Act, since stretched vastly by administrative decisions and court interpretations.

There is no doubt that administration policy today is dedicated to the preservation and strengthening of labor monopolies in spite of occasional clashes with union leaders. A good case also can be made that the original grant of power to union leaders was made with the approval of the majority of the public. Whether that still is true is debatable, particularly in view of the majority in Congress that voted to override the veto of the Taft-Hartley Act, not to mention the earlier House majority that approved even more far-reaching proposals for curbing the labor monopolies that have grown up under the Wagner Act.

Whatever, therefore, might be said about the way union leaders operate, the fact is that the opportunity to exercise—and abuse—monopoly power has been afforded them through legislation on the books, plus administrative and judicial partiality. If, as has been indicated, this is contrary to present majority thinking on the part of the public, the basic job is to get that thinking translated into effective legislative and administrative action. If public thinking is otherwise, the first step is to provide the facts that will lead to a reversal and consequently to the desired reform.

It is fair to say that the release of the terms of the 1947 bituminous agreement really startled the country. The evidence indicates that the astonishment grew out of an impression that the Taft-Hartley Act, passed over a bitter Presidential veto June 23, would substantially redress existing inequality in bargaining power and thus render impossible a victory as sweeping as that generally credited to Lewis. Since the result was felt to be the opposite, "How?" became an immediate question, with emphasis on whether the contract conformed to the Taft-Hartley Act.

This question found the sponsors of the Act at loggerheads. Representative Hartley charged on the House floor July 9 that the bituminous contract contained one direct violation and other examples of

"collusion" to violate. Holding that the Act provides that dues only can be checked off, Hartley declared that the broader contract provision for checking off not only dues but also initiation fees and assessments was a direct violation. The entire contract, he contended, "looks like collusion between the operators and the union to force small companies out of business."

Representative Hartley's stand was challenged by Senator Taft on June 10. "I don't see," he said, "that the contract violates the new labor bill in any respect whatever. The whole purpose of the bill is to promote free collective bargaining. Of course, the economic wisdom of some of the terms is something else again. If the operators want to give away their shirts, that's their business."

Congressional View

One repercussion of the signing of the bituminous agreement—and the parallel anthracite contract—was the effect on members of Congress. Privately—so far—some Congressional leaders state that they feel they have been let down as a result of the coal contracts and the general publicity given to other means of getting around the terms of the Taft-Hartley Act in negotiating agreements. They contend that they faced up to the power of labor leaders in their districts in the belief that reforms were in the best interests of the country, only to find that employers were sacrificing proffered opportunities to help curb monopoly power by assenting to provisions nullifying many portions of the Act.

But admitting the existence of grounds for such a reaction and for fears that even in the short run the effects would be more inflation and a harder time for the industry, the operators were confronted with a monopoly in being and already beginning to function. A choice had to be made between working out an agreement on the best possible terms or precipitating a long work stoppage which, under conditions at the moment, very likely would result in severe damage to the economy, in addition to increasing the likelihood of seizure and nationalization of the mines. In a statement June 10 to The Joint Committee on the Economic Report, George M. Humphrey, president, Pittsburgh Consolidation Coal Co., analyzed the situation as follows:

"When the mines were turned back by the government to the operators last month, Mr. Lewis simply said his men were unemployed, there being no contract in effect, and that if the operators wanted to employ them, certain conditions would have to be met or the men would not go to work. Whether this would constitute a strike or not within the meaning of the new labor law was something for the lawyers and courts to decide, but there was no doubt that little, if any, coal would be mined in the meantime.

"This was not a theoretical matter: it required a practical decision. There were two immediate courses open: either let the mines stay idle and resort to mediation, litigation or legislation, or another government seizure, or, on the other hand, work out with the union the best possible terms that could be voluntarily agreed upon.

"The first consideration was what would the consequences of each of these alternatives be?

"Coal is in great demand both here and abroad and stocks are relatively low. Without coal production, it would be only a short time before transportation would be crippled, steel production curtailed and all manufacturing dependent upon coal, steel and transportation would be seriously interrupted, with consequent unemployment and increased shortages of many commodities for use both here and elsewhere throughout the world. While 400,000 miners would face payless paydays voluntarily, there would be many thousands of other workers who would be forced into involuntary idleness and loss of pay. Further shortages would force prices higher and the familiar spiral of increases would continue to go further out of control.

"The Taft-Hartley law was new and its application to these particular circumstances involved unsettled questions upon which legal authorities differed.

Seizure Talked

"The Smith-Connolly law had expired and talk was current concerning the possibility of new legislation by Congress for seizure by the government or proposed new remedies the result of which no one could foresee. All this would be time-consuming and nothing was suggested that would start the mines working after the miners' holiday and prevent the serious interruption to the production of coal with all the vicious consequences on the economy of the Nation, as well as those resulting from further shortages of many much-needed articles of commerce. Furthermore, all our past experience had been that when once the government intervened in a labor dispute it finally granted about all that was asked for by the union, but only did so after serious strikes had taken place, causing great damage and inconvenience to the public, as well as to our customers and ourselves.

"On the other hand, what would be the result if an agreement could be reached through collective bargaining?

"The men would then return to work and production would continue in coal, steel and many other commodities. There would then be no crisis threatening soon to paralyze a large part of American business. As production rose and finally supplied demand, there would be an application of the economic law of supply and demand, with a resulting pressure on prices. Clearly, the choice of courses to follow was that of reaching an agreement and maintaining production all along the line with all the benefits to the entire Nation that would result therefrom, unless the price of such an agreement was unreasonable and excessive."

Monopoly's Effects

It is no secret that there is wide disagreement on the reasonableness of the contract terms, this in spite of the feeling of the majority of the operators that hours and wages needed adjustment and that joint action in other directions would promote industry progress. The fact that practically the entire industry signed almost immediately in spite of such a disagreement is a further reflection of the strength of the monopoly power brought to bear, as is widespread operator dissatisfaction with terms—a direct result of the fact that monopoly gives the party of the second part few opportunities to present his case, valid though it may be.

In the final analysis, however, the effects of specific contracts must be judged from the means they provide for promoting peace, stability and progress. The hope for a lasting peace was a major factor in operator thinking. Said Benjamin F. Fairless, president, United States Steel Corp., in commenting July 7 on the tentative agreement: "I am hopeful that the result will be industrial peace in the bituminous coal industry for a long time to come. This should prove highly beneficial to the whole economy of the Nation."

A peaceful period would, without question, be of immense help to the

industry. Among other things, it would provide a period in which operators—particularly commercial operators—could concentrate on raising mining efficiency, putting added pressure behind research and stepping up public-relations and sales programs. A period of peace and stability, therefore, should have been Consideration No. 1 in negotiating the new contracts.

"Able and Willing"

How, finally, was the question of a period of peace and stability handled? First, it is stated that the contracts are contracts only when the miners are "able and willing to work." As a little sidelight, the men at one mine found themselves not "able and willing to work" when starting time was changed from 7:30 to 8, but miraculously recovered when the company reverted to the old time. Second, the contracts can be terminated upon 30 days' notice. Third, the penalty clauses formerly a part of a number of bituminous wage agreements are, with a resounding flourish, "hereby rescinded, cancelled, abrogated and made null and void."

"Why," it might be asked, "should there have been such complete exemption from any obligation to keep the contract alive for its ostensible period or see that the men stayed on the job?" One possible reason is another by-product of government intervention, which brought Lewis into the courts in 1946 and cost both him and the union some money. It would be logical, therefore, if he were to take care in any future contract to protect himself completely against any further legal brushes.

Whatever the reasoning or motives involved, however, an analysis of the termination provisions and exemptions included in the contract leads inevitably to the conclusion that the operators gave quite a bit and got in return only a memorandum of the terms on which the miners are to be hired. There is nothing in the contract binding either side—and especially the union—to the preservation of the terms of the contract for any definite period beyond the first 30 days—and not even in the first 30 if the miners choose to avail themselves of the "willing and able" clause.

Analysis of what the new contracts mean to the future of the industry must also take cognizance of the new charges of "collusion"—this time not collusion between operators alone but between operators and union leadership. "Collusion," another word for "conspiracy," is, for all practical purposes, hooked up with monopoly where commerce is concerned. In other words, collusion usually is practiced to achieve a monopoly or to become part of one already in existence. It also, according to the usual definition, is voluntary in nature.

Looking at the situation once more, where is the monopoly in coal mining? Does the industry have a monopoly on the fuel market—or any hope of one? The answer is "No." Does any operator or small group of operators have a monopoly in coal production—or any hope of one? Again the answer is "No." Where, then, is there a monopoly in or substantially affecting coal mining? The answer is the mine-labor monopoly held by Lewis—a monopoly founded on the Wagner Act and fostered by governmental machinery and administrative support.

If nothing else showed administration support of the monopoly held by labor leaders, the inconsistency in approach would prove the point. For example, President Truman, in a public statement July 14 asking coal and steel producers to hold price increases in abeyance, declared that "the people of the country have the right to demand that their prosperity shall not be imperilled by immediate increases in the price of coal and in the price of steel."

One-Way Street?

It would seem that the public also would have the right to ask that labor leaders refrain from imperilling prosperity by forcing up wages and laying heavier assessments on industry—the real reasons for price increases. The record, however, reveals nothing but Presidential silence on this score, while it does show the administration indorsing, only a short time ago, the theory that wages could be increased and prices reduced at the same time.

Bucking monopoly power is hard at best but it becomes harder still when government policy is aimed at preserving and increasing it, even to the extent of resorting to seizure when the results in public discomfort become too embarrassing. With that fact in mind, the action of the operators becomes more understandable, Senator Taft and others to the contrary, although calling it "collusion" is shooting pretty wide of the mark.

The evidence is definite that the large majority of the operators signed not because they had hopes of increased personal or corporate gain, or because they thought the contracts were fairly and equitably arrived at, but because they were faced with overwhelming monopoly power. Although Congress has made a start toward curbing that power, it did not act because there was collusion between operators and miners. The real collusion is between government and union leadership. If it continues and leads to supplementary collusion between employers and union leaders in coal mining, the responsibility will rest on administration policy and not on the employers.

The 1947 coal contracts are concrete evidence that: (1) the monopoly powers of labor leaders have been disturbed but little by the Taft-Hartley Act, although that Act, nevertheless, is a start in the right direction; (2) employers still are faced with Hobson's choice in dealing with the wielders of these monopoly powers, especially in critical times like these; (3) the public, which includes the employees as well, pays the bill and must continue to do so until these powers are curbed.

The Job Ahead

What happened with the 1947 coal contracts also indicates that coal, as well as other industries, still has a big job on its hands. Coal can resolve to stand its ground and insist on fairness and due respect for industry, employee and public interests. Among the risks are: (1) an adverse public reaction growing out of inconvenience and misunderstanding fostered by intensive propaganda by union leadership within and without the government; (2) attempts by administration, Congressional and other advocates of labor monopoly to advance the cause of union leadership by seizing or nationalizing the mines.

The second course offers no quick remedy, either, although it should lead to a more fundamental solution to the problem of labor monopoly. It is education—education of the public and education of the miner. This is no new suggestion but it is no less valid, particularly as far as the mine worker is concerned. It remains true that if the miner is convinced, on the merits of the case, that his fortunes and those of his employer are one and the same, union-leadership monopoly automatically becomes impracticable. Enlisting, by word and deed, the miner's active cooperation still stands as the best way to peace and progress in coal mining. The rewards are well worth the effort.

Facts About the Taft-Hartley Act

"The Labor Management Relations Act, 1947," better known as the Taft-Hartley Act, became law by a more-than-two-thirds vote of Congress June 23.

Is the Act designed to bust unions?

Does the Act take away the right to strike?

Does the Act force a man to work if he doesn't want to?

Does the Act, as has been charged, seek to "enslave" the workers of the country?

What's in the Act is the answer to these questions. That answer is "No!" For example, far from union-busting, the Taft-Hartley Act repeats the declaration of the Wagner Act that it is government policy to promote commerce by, among other things, "encouraging the practice and procedure of collective bargaining and by protecting the exercise by workers of full freedom of association, self-organization and designation of representatives of their own choosing for the purpose of negotiating the terms and conditions of their employment or other mutual aid or protection."

Strike Right Guaranteed

The Taft-Hartley Act, in Title I, again guarantees the right to strike as follows: "Nothing in this Act, except as specifically provided for herein, shall be construed so as to interfere with or impede or diminish in any way the right to strike, or to affect the limitations or qualifications on that right."

To make doubly sure that no man is forced to work against his will, one of the final provisions of the Taft-Hartley Act (Sec. 502) says this: "Nothing in this Act shall be construed to require an individual employee to render labor or service without his consent, nor shall anything in this Act be construed to make the quitting of his labor by an individual employee an illegal act; nor shall any court issue any process to compel the performance by an individual employee of such labor or service, without his consent; nor shall the quitting of labor by an employee or employees in good faith because of abnormally dangerous conditions for work at the place of employment of such employee or employees be deemed a strike under this Act."

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Boiled down, this section of the Taft-Hartley Act means that a man doesn't have to work if he doesn't want to and that even the courts can't make him.

Why, then, was the Taft-Hartley Act adopted? The Act itself gives the reasons. They are: "To prescribe the legitimate rights of both employees and employers in their relations affecting commerce, to provide orderly and peaceful procedures for preventing interference by either with the legitimate rights of the other, to protect the rights of individual employees in their relations with labor organizations whose activities affect commerce, to define and prescribe practices on the part of labor and management which affect commerce and are inimical to the general welfare, and to protect the rights of the public in connection with labor disputes affecting commerce."

Purpose of the Act

The aim of the Taft-Hartley Act, in other words, is to protect the rights of both workers and employers, to help workers with unions, to outlaw bad practices by both unions and management and to protect the public. To accomplish this, the Act does nine things:

1. Increases the authority of the National Labor Relations Board and adds a general counsel to prepare and present cases.
2. Gives the federal courts more power to look over and pass on decisions of the board.
3. Sets up machinery to hold off, for 80 days, strikes that threaten national health and safety.
4. Rules out the closed shop.
5. Makes it necessary that union shop or maintenance-of-membership contracts be approved by a secret ballot.
6. Lists and defines unfair practices by unions, as well as by employers.
7. Rules out secondary boycotts, jurisdictional strikes and union attempts at feather-bedding.
8. Requires that information about union affairs be given the government and members.
9. Makes it unnecessary for employers to bargain with foremen's organizations unless they want to.

A more detailed summary of the provisions of the Taft-Hartley Act is as follows:

Individual Worker Rights

1. A worker may form, join or assist an organization for the purpose of bargaining, through representatives of the workers' choice, on wages, hours and conditions of employment, or for other mutual protection or aid.
2. A worker may also, if he wants to, stay out of a collective-bargaining group unless the contract provides for a union shop.
3. A worker may take his grievances directly to management. The union's representative, however, must be given a chance to be present when the final adjustment is made and that adjustment must not violate the union agreement.
4. A worker may vote by secret ballot to choose his bargaining representative, to say whether he wants a union shop and also to say, when a dispute involves a national emergency, if he will accept his management's latest wage offer instead of striking.
5. A worker, if he belongs to a group which he believes is the majority while his employer recognizes another, may ask for an election.
6. A worker may strike for any reason except secondary boycotts, jurisdictional disputes, enforcement of featherbedding demands or forcing work to be taken from one group and given to another. Such strikes are specifically forbidden.

Union "Musts"

If a union wants the protection of the Wagner and Taft-Hartley Acts, it must do several things.

1. The union must file every year a report with the Secretary of Labor giving its name and main place of business; the names, titles, pay

and allowances of its three main officers and of all others getting more than $5,000 a year; how officers are elected; the initiation fees, dues, etc., members must pay; the rules governing salaries, dues, initiation fees and so on; and the money received and spent during the year. The union also must give this report to all its members.

2. The union must file with the National Labor Relations Board each year a sworn statement by each officer that he is not a member of the Communist party or affiliated with it, or of any organization seeking to overthrow the government illegally or by force.

3. The union must give 60 days' notice before it ends a contract. No work stoppage can be called during the 60 days or until the contract expires, whichever is longer.

4. The union must bargain collectively with management.

Union "Must Nots"

1. The union must not use force against its members to prevent them getting their lawful rights.

2. The union must not interfere with the employer's right to select his own bargaining agent.

3. The union must not attempt to make an employer discriminate against an employee who has not been allowed to join. If an employee refuses to pay dues or initiation fees, however, the union can recommend firing or other penalty, if there is a union-shop agreement.

4. The union must not declare secondary boycotts or call jurisdictional strikes.

5. The union must not try to make an employer take work from one group of men or union and give it to another.

6. The union cannot demand excessive or discriminatory initiation fees.

7. The union cannot spend money in a federal election or contribute to any candidate or party.

Employer Rights

1. Employers may talk freely to workers provided they do not offer bribes or make threats.

2. The employer may ask for a government election when there is an argument over who represents a majority of his employees.

3. The employer can sue in the federal courts to collect damages from a union for breaking a contract, but cannot sue individual members.

4. The employer can sue for damages if his property or business is injured by a boycott or jurisdictional dispute.

5. The employer can refuse to bargain with a foremen's union unless he wants to.

Employer "Must Nots"

1. The employer must not interfere with or try to prevent employees from getting their lawful rights.

2. The employer must not control or interfere with a union or support it in any way. However, employees can talk with employers during working hours without pay loss.

3. The employer must not discriminate in hiring or firing because of union membership, or encourage or discourage union membership.

4. The employer must not fire or penalize an employee for filing charges or giving testimony.

5. The employer may not refuse to bargain with representatives of his employees.

6. The employer must not end a contract without 60 days' notice.

7. The employer may not pay or deliver, or promise to do so, any money or other valuable thing to an employee representative.

8. The employer may not contribute to union health-welfare-retirement funds unless they are run by union and management together and the money is spent for the purposes stated in the Act.

9. The employer cannot check off union dues unless the worker says so in writing.

10. Companies cannot spend money in a federal election or contribute to any candidate or party in such an election.

Union and Employer "Musts"

1. Union and employer, in discharging their collective-bargaining duties, must meet at reasonable times, confer in good faith and make a written contract if either party wants it. However, neither party is required to agree to a demand or make a concession.

2. When either the union or the employer wants to end a contract, it must give 60 days' notice; offer to meet with the other party; notify the Federal Conciliation and Mediation Service and similar state services within 30 days of the date of giving notice; and continue, without strike or lockout, all the terms and conditions of the contract for 60 days or the expiration date of the contract, whichever is later.

NLRB Powers

1. The National Labor Relations Board may order employers and union to stop unfair practices.

2. The board may order firing or rehiring of employees with or without back pay. If awarded, the back pay will be paid by the employer or the union, whichever is responsible for the discrimination.

3. The board may ask the federal courts for a temporary injunction to stop unfair practices by unions.

4. The board may withdraw the protection of certain parts of the Act from employees who strike during the 60-day notice period.

National Emergency Plan

1. When a national or industry-wide strike or lockout threatens public health or safety, the President appoints a board to make a public report of the facts.

2. After studying the report, the President may request the Attorney General to ask a federal court for an injunction.

3. When such an injunction is issued, the President again calls in the board of inquiry, which reports to him again after 60 days unless the dispute has been settled. This second report is made public and within 15 days the National Labor Relations Board must hold a secret election to see if the employees want to accept the employer's final offer. The board must report the election results in five days.

4. After the election report, the injunction is removed and the President reports to Congress with recommendations for action.

Conciliation and Mediation

The Taft-Hartley Act sets up the independent Federal Conciliation and Mediation Service to assist in settling disputes and to urge no strikes or lockouts. It can only offer its services and has no other powers.

Committee Provisions

The President is given power to appoint a panel of 12 men representing labor and management to advise on avoiding industrial disputes and settling them voluntarily. A committee of seven senators and seven representatives also is set up to study and report on means of achieving stable and friendly industrial relations, making its first report by March 15, 1948, and its final one by Jan. 2, 1949.

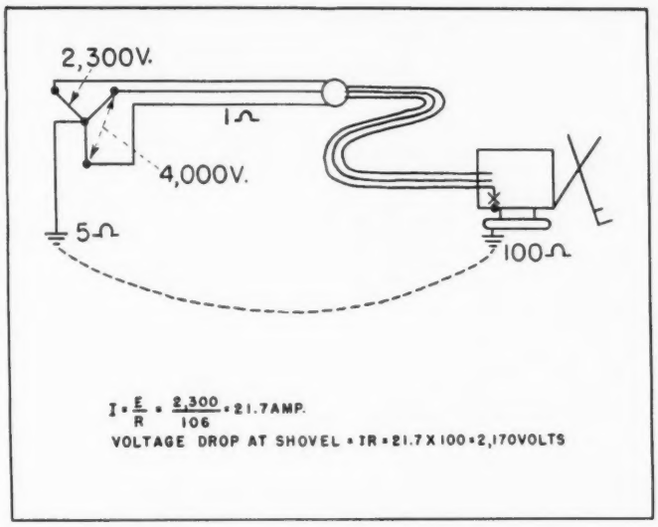


FIG. 1—Simple open-pit power-distribution scheme with Y-connected transformers.

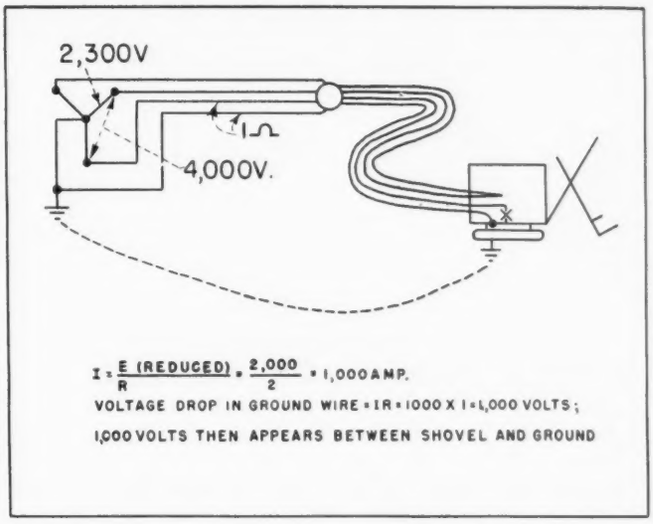

2,300V
1Ω
4,000V.
I = E (REDUCED)/R = 2,000/2 = 1,000AMP.
VOLTAGE DROP IN GROUND WIRE = IR = 1000 X 1 = 1,000 VOLTS;
1,000 VOLTS THEN APPEARS BETWEEN SHOVEL AND GROUND

FIG. 2—Simple power-distribution system for open-pit mining with ground wire added.

Grounding Stripping Units With High and Low Voltages

Methods and Equipment Available for Grounding of Open-Pit Equipment — Features and Performance of Various Systems—Locating Cable Faults—Low-Voltage Grounding Suggestions

By J. J. HUEY
Chief Engineer, The United Electric Coal Cos., Chicago

IN THE grounding of portable equipment as used around open-pit mines (stripping shovels, loading shovels, draglines, drills, pumps, etc.), we are aware that certain safety precautions are necessary since high power-supply voltages are necessary to deliver the energy required for normal operation. It probably never will be possible to protect personnel from careless handling of high-voltage circuits, but it has been recognized that hazards do exist in ordinary schemes of power delivery as used in industry on stationary equipment when these same schemes are simply transferred to open-pit mining operations. Originally, the power distribution circuits for this type of equipment were simply three-wire ungrounded units and afforded very little protection for the men. In industrial plants it is possible to depend upon very heavy ground connections in the form of steel buildings and often the personnel also are standing on insulated structures.

Abstract of a paper presented at the 1947 meeting of the Mine Inspectors' Institute of America.

Earth Grounds Unsatisfactory

In general, a three-wire system with simple earth-grounding return for protection is not a satisfactory way to operate portable equipment. We have found that earth grounds are, at best, highly undependable, having quite high resistance and resistance values which vary from season to season. We have therefore come to place a large measure of reliance on a metallic ground wire in the distribution system. This, of course, is grounded periodically as an added precaution.

Originally a simple three-wire cable was used in connection with portable equipment, but this later was changed to what is known as a Type G cable having three phase conductors and three ground wires. The three ground wires are incorporated for added safety in the event of failure of one or more. Modern practice requires the use of what is known as SHD cable, or something similar. This cable has three phase conductors, each of which is insulated and shielded, and also three ground wires, the same as the Type G cable. The conductor shield is not only for protection of personnel, but also will increase the life of the cable or high-voltage systems since it distributes voltage stresses equally throughout the insulation. I have seen cases where the copper conductor carrying high voltage was visible on Type G cable. This, of course, would be an extremely great hazard, and the shielding would normally give good protection against this danger.

Fig. 1 shows a simple power-distribution scheme using Y-connected 2,300-volt transformers delivering 4,000-volt three-phase power to a shovel. It will be noted that I have assumed a substation-ground resistance of 5 ohms, which is an av-

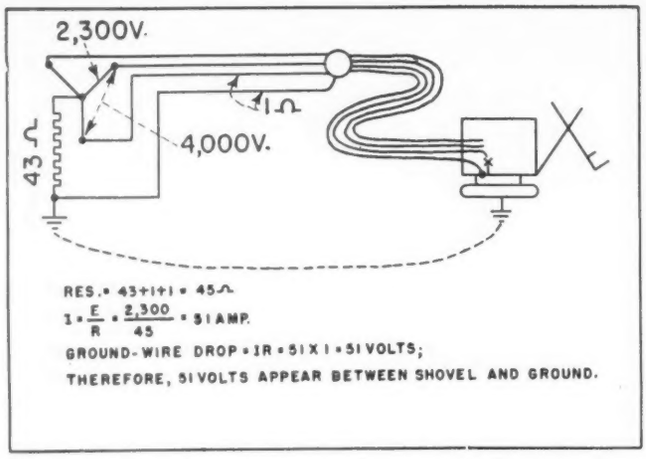

2,300V.
43 Ω
1 Ω
4,000V.
RES. = 43+1+1 = 45 Ω
I = E/R = 2,300/45 = 51 AMP.
GROUND-WIRE DROP = IR = 51 X 1 = 51 VOLTS;
THEREFORE, 51 VOLTS APPEAR BETWEEN SHOVEL AND GROUND.

FIG. 3—Simplest form of recommended power-distribution system for open-pit mining operations.

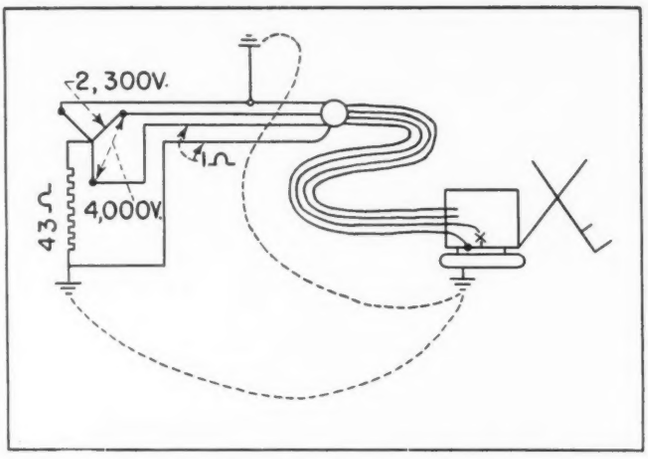


FIG. 4—Power-system condition with two simultaneous grounds on different phases at separate locations.

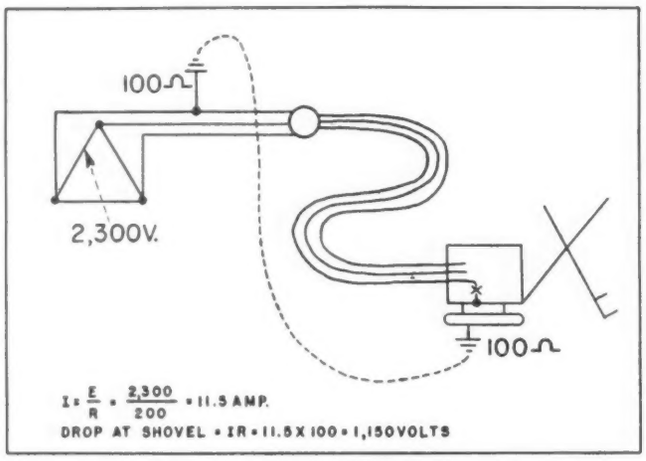


FIG. 5—2,300-volt delta-connected power system for open-pit work without protection.

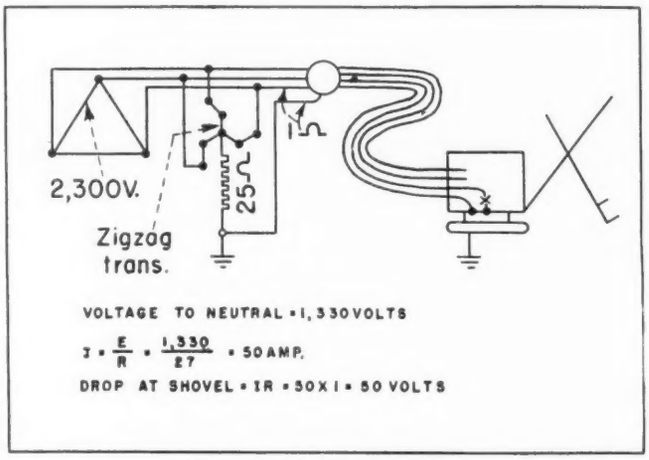


FIG. 6—Zigzag transformer with ground-protective resistor in 2,300-volt delta-connected system.

erage value, and a shovel ground of 100 ohms. In this case, no ground wire was used and, under dry-weather conditions, the resistance at the shovel might well be at least 100 ohms. From the calculations given me would then produce a voltage, appearing on the crawler of the shovel, of around 2,170 volts to ground in the event of a failure of the system to the structure of the machine. This voltage certainly is extremely dangerous and something must be done to protect men working around equipment under these conditions.

In Fig. 2 we add a ground wire to the system and, in this case, can more or less ignore the resistance value of the earth ground itself. So long as we have a metallic connection, most of the current will flow through the wire. I assume the ground-wire resistance to be equal to the conductor, each at 1 ohm, giving a total circuit resistance of 2 ohms in the event of a failure on the machine. This very low resistance will, of course, produce an extremely high current and tend to short circuit one transformer at the substation. This would reduce somewhat the transformer voltage, perhaps to a value around 2,000. However, assuming 2,000 volts and 2 ohms of resistance, we produce 1,000 amp. of current, which would produce a voltage drop of 1,000 volts in the ground wire. Since the substation ground is the only true ground we can produce in the vicinity, 1,000 volts would then appear between the crawler and the earth. This also would be an extremely dangerous condition.

Clearing Only Protection

With this arrangement, the only possible protection for personnel is through a rapid clearing of the fault in the hope that sufficient time will not have passed to have caused a fatal injury. However, tests have proven that even with high-speed settings on oil circuit breakers and relays, a good many cycles pass before such a fault can be cleared up. Therefore, it seems obvious that something better is required for adequate protection to personnel.

Fig. 3 provides in its simplest form the recommended type of power distribution intended to prevent injuries and correct the difficulties inherent in the two previous arrangements. Here we have added a neutral ground resistor which is intended to limit the ground current in the event of a failure of insulation to ground at any point. We now have a total circuit resistance of 45 ohms with a resultant ground current of 51 amp. and a voltage drop produced in the ground wire, which also appears at the machine, of 51 volts. Because of this, the major portion of the voltage drop created by the ground failure appears across the 43-ohm ground resistor. This resistor is designed to handle such a voltage safely and at a point where it will not create a hazard.

The resistance we use is of railway-type construction and is designed for heavy-duty continuous service in case of failure of other equipment. There is one caution which should be kept in mind in

connection with this system, however, and that is that the operator must be certain that he has a continuous metallic ground circuit, as otherwise the voltage drop at the shovel could be in excess of that across the resistor.

Turning back to Fig. 1, which indicates 100 ohms at the shovel, it would appear that two-thirds or more of the voltage drop would then appear at the shovel and a dangerous voltage condition would exist. Failure of the ground wire would reduce the system shown in Fig. 3 to approximately the same condition we had in Fig. 1. As an added precaution, it is desirable to use many intermediate grounds on the system. These would then help to preserve the ground continuity, but are only a substitute.

Selecting Resistor Value

There is a point of contention in the selection of the ground-resistor value. I, personally, believe that the 43-ohm 50-amp. arrangement is more desirable than the alternative, which uses an approximately 90-ohm 25-amp. resistor. The main advantage in the use of a 25-amp. resistor is that approximately half as much voltage drop will appear at the shovel, with somewhat reduced danger to personnel. When we use a long power line to serve a shovel we may actually have a ground-wire resistance of around 2 ohms, in which case as much as 100 volts might appear at the shovel with the 50-amp. scheme. We do not feel that this voltage value is particularly dangerous since the man ordinarily would not receive the full benefit, and in any case would do so for only a short moment.

I would like to mention that with this system it occasionally happens that the cable will fail without blowing through the jacket to make the failure visible. This may cause the location of the failure to be very difficult and several schemes have been tried. We have used the so-called cable-blowing transformer, which consists of a high-voltage winding and a low-voltage high-current winding—the first to break down and the second to burn out the weak spot. Our experience with these transformers, however, has not been satisfactory in all cases, since it sometimes happens that the current-carrying capacity of the transformer is insufficient to blow the cable, and the transformer merely heats up rapidly through passing high currents through the whole length of the cable.

We, therefore, have hit upon two other schemes for locating such failures. The first is the use of an ohmmeter on the cable between the grounded conductor and the ground wires. This often will show a moderately high resistance and, while one man watches the ohmmeter, another can walk the cable, kicking it until the ohmmeter begins to react to this kicking. This ordinarily will permit the fault to be located within a few inches. In case this method fails, we sometimes will put a cable on the power system and, after clearing all other equipment from the system, we will short out the ground-protective resistor and literally blow a hole in the cable. This, however, is done only as a last resort.

Another hazard is shown in Fig. 4, which indicates that a system has failed on two different phases at two different points at the same instant. This is a hazard that is constantly faced on any system of this type, since a normal ground failure will instantly put excessive voltage on the other two phases and any weak spots are then much more likely to fail. Such a simultaneous failure at two points will cause extremely high ground voltages to appear between the shovel and ground, since in this case the current is flowing external to the ground wire and ground resistor and directly from phase to phase through the earth. There is only one protection for this scheme and that is quick tripping of the circuit to prevent its continuous flow.

Fig. 5 shows a 2,300-volt delta-connected power-distribution system in which no protective scheme is used. This will cause no difficulty until two phases are grounded at different points, as happened in Fig. 4. In this case dangerous voltages will appear at the machine also.

Zigzag Transformer Added

To solve this problem we can add a so-called zigzag transformer to the system and ground at the neutral point, as shown in Fig. 6, using a ground-protective resistor. This reduces the problem to approximately the same set-up as we have in a four-wire grounded-neutral system using a ground resistor, as shown in Fig. 3. This is probably the safest way to protect a system of this type, but it is not the only method possible. Another scheme will be discussed later, in which it is possible to remove the circuit instantly whenever a single ground appears. This, however, places complete dependence on the relays and tripping equipment and is no doubt the reason why it is not used more often.

Fig. 7 shows the simplified arrangement of the basic protective scheme used to clear the system in the event of a failure either at ground or phase to phase through the insulation. Note that this eliminates many of the auxiliary devices ordinarily used and is intended merely as an indication of the general arrangement used. In this set-up, the ground current operates through a 50/15-amp.-ratio current transformer and, through a "direct" current-trip coil, causes the breaker to open.

Tripping Energy Obtained

We have chosen the peculiar ratio given to obtain a continuous thermal rating on the primary side of the current transformer and to obtain plenty of tripping energy to make sure the breaker opens. It is possible that in some cases the ground current may not reach 50 amp. because of high-resistance grounds and, therefore, we need a fairly low ratio to make sure that sufficient tripping energy always is available, even though the current drops to 20 or 25 amp. Such a condition can exist on arcing grounds. This is one argument in favor of the 50-amp. system versus the 25-amp. set-up, since it gives more tripping power in most cases. This arrangement uses direct tripping on both of the phase-overload devices, and these then have to be adjusted to work properly with the loads being carried on the system.

We have found through experience that oil dashpots, which are sometimes used to produce a time delay, are not satisfactory on portable equipment, primarily as a result of the temperature variations to which they are subjected. These dashpots can be adjusted in warm weather but in cold weather do not function properly. I have selected a phase-current transformer ratio of 300/5, since this is best suited to the large stripping equipment we now use. This has some disadvantages as will be discussed later.

The preceding arrangement, while suitable for a simple one-unit mine, is not ordinarily desirable where more than one machine has to operate simultaneously off the same system. In the latter case, we prefer to clear up a ground fault on one portion of the system without affecting the operation of the other

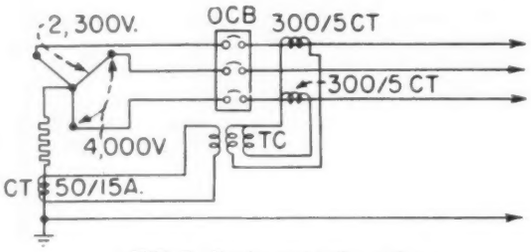


FIG. 7—Basic protective scheme.

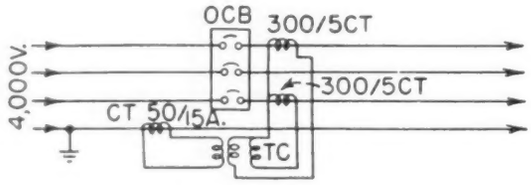


FIG. 8—Selective-tripping scheme.

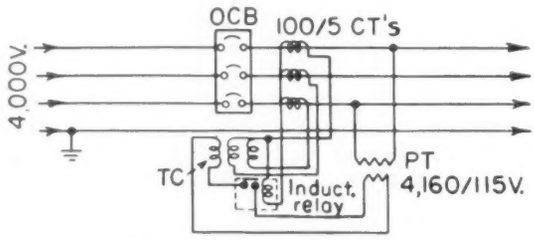


FIG. 9—Selective-tripping scheme.

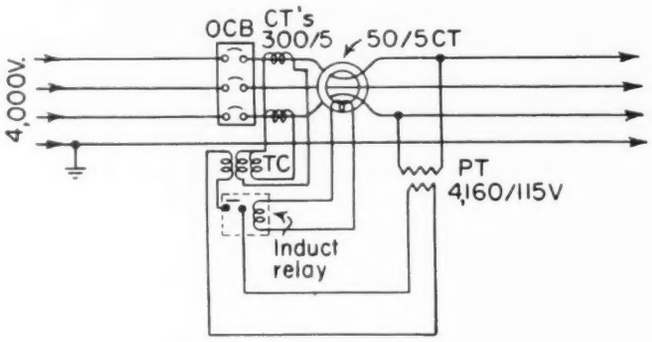


FIG. 10—Universal-protective scheme.

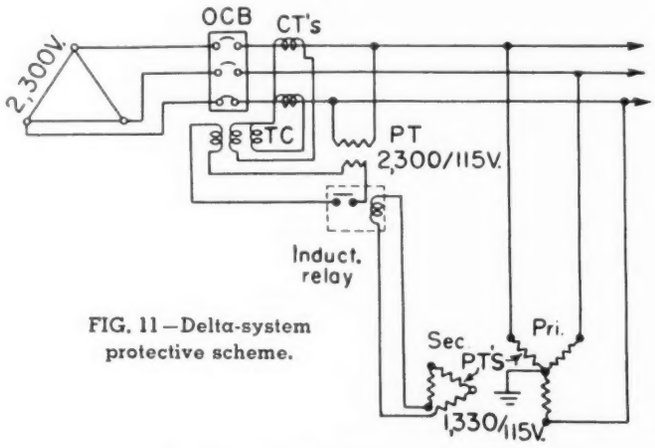


FIG. 11—Delta-system protective scheme.

machines. Therefore, some selective arrangement is necessary to achieve this end. Fig. 8 is a simple arrangement, showing the 50/15 amp. current transformer in the ground wire.

Stray-Current Question

Normally no difficulty would be experienced with this arrangement, but there is always the possibility that stray ground currents will bypass the metallic ground circuit under unusual conditions. In such a case, it is possible that insufficient tripping energy would be available to clear the circuit. Therefore, it is ordinarily desirable to modify the circuit shown in Fig. 8 to one such as given in Fig. 9, in which a differential arrangement of the phase-current transformers is used.

On most schemes we use only two-phase current transformers since this is sufficient to protect all three phase current conductors. In this case, however, we use a third current transformer with only two phase current trip coils and run the common return from all three current transformers through an induction relay. Normally, when the circuit is working properly, all three phase currents are balanced and no current will flow through the induction relay. However, when a ground occurs an unbalance exists, causing current to operate the induction relay. Of course, it is possible to use solenoid-type relays in place of this induction unit, but we have found that the latter are much more dependable and do not greatly increase the over-all cost. When using such a relay, a potential trip coil must be used on the circuit breaker, and in connection with it a potential transformer to furnish the necessary tripping energy.

It will be noted that I have changed the current-transformer ratio on this arrangement from 300/5 to 100/5. Therefore, this system is satisfactory only on smaller equipment, since these transformers cannot handle the load currents required by big stripping machines. The reason for this change is that when using a 300/5 ratio and a ground-fault current of 50 amp., we obtain a secondary differential current on the transformers of only 0.83 amp., which is not enough to operate a standard induction relay satisfactorily. In other words, the relay is operating at a point on its curve where it requires a great deal of time to function. Also, if we use one of the more sensitive types of induction relays, we find that it has such a high volt-ampere burden that the current transformers are not capable of maintaining their ratios and, consequently, cannot produce sufficient current to operate even these sensitive relays. We have discovered this from experience and also found it necessary to change a number of equipments. When using a 25-amp. ground resistor, it is, of course, obvious that such an arrangement would be more out of the picture than here.

Doughnut Transformer Used

The scheme shown in Fig. 10 is basically what we prefer since it is possible to use it either in main substation work or at any point on the system. This flexibility makes it much more valuable around the open-pit mine. In this case we have substituted a doughnut-type current transformer for a ground-current device. This works very much the same as the current transformers in the differential arrangement shown in Fig. 9, but has the added advantage of having a low ratio of

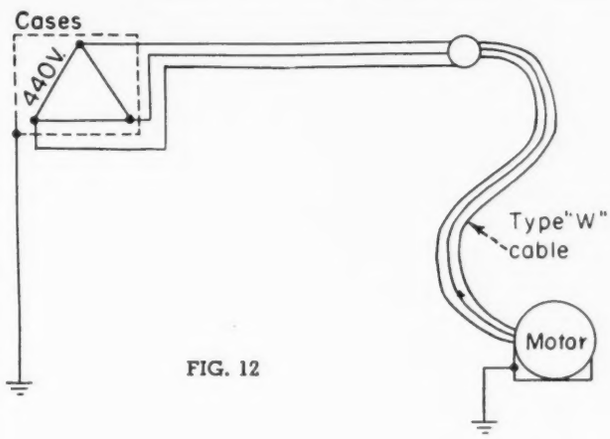


FIG. 12

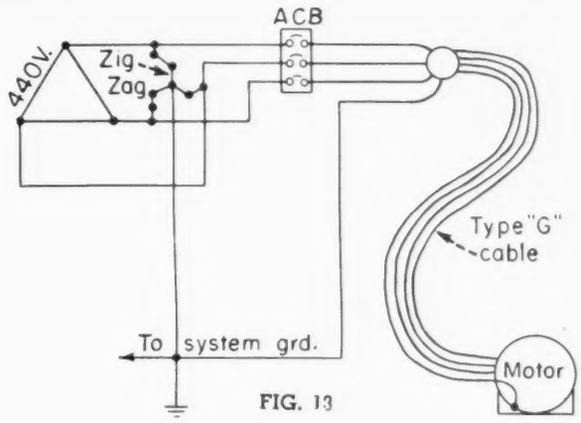


FIG. 13

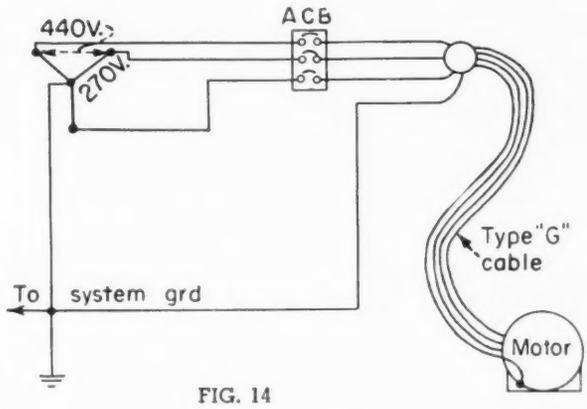


FIG. 14

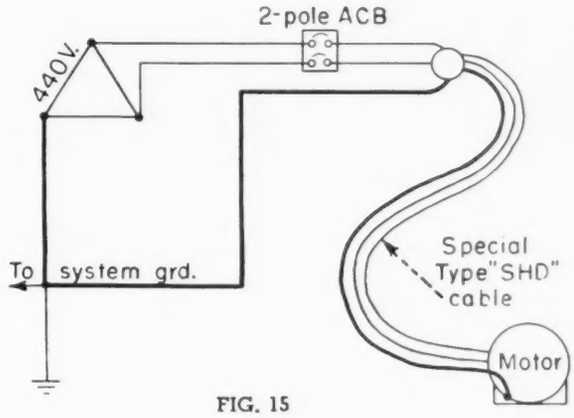


FIG. 15

50/5 and, therefore, can be used with a simple standard induction relay and at the same time give ample power to make the relay operate.

As previously mentioned, there is a way to protect a delta system and this scheme is shown in Fig. 11. This is similar to previous arrangements, with the exception that instead of a ground-current transformer we use a Y-delta connection of potential transformers, the neutral of the primary being grounded and the delta secondaries being closed on the operating coil of an induction relay. Normally, with this arrangement, there is no circulating current in the secondary since all secondary voltages are balanced. However, in case one phase goes to ground the voltage balance of the primary windings of these transformers is upset, causing current flow to occur in the induction relay. This immediately trips the circuit.

In the past months we have been trying to develop some satisfactory means of grounding the low-voltage distribution systems as used around our open-pit mines. Most of these circuits are delta-connected 440-volt three-phase arrangements and, of course, when one phase is grounded it sometimes is possible to feel the "bite" of the ground voltage when touching equipment. Ordinarily, this is not a serious hazard until more than one phase becomes grounded, in which case current will flow from unit to unit and from phase to phase through the earth.

Delta Modification

As discussed previously, in some of the high-voltage systems it would be possible to modify the standard delta arrangement by use of a zig-zag transformer, as shown in Fig. 13, or a Y-connected secondary as shown in Fig. 14. These two circuits are fundamentally the same and both produce a considerable voltage drop in the ground wire, which may be in the neighborhood of 200 volts. This may not be extremely dangerous and, through the use of an air circuit breaker, it would be possible to clear the line very quickly.

As an alternative to the above arrangement we, in the Middle West, are hoping to develop the circuit shown in Fig. 15, which purposely grounds one phase and uses a two-pole air circuit breaker and a special Type SHD low-voltage cable. It will be noted, too, that we have increased the copper size of the ground-wire conductor. This is to limit the line drop in the ground wire to a safer value. If this conductor has twice or three times the cross-section of the other two phase conductors, the drop will be reduced in proportion. We also have felt that it would be desirable to shield the phase conductors as an additional precaution, since in this case, where we have purposely grounded one phase, we do have somewhat greater voltage strains and definitely a more serious hazard to personnel in the event they actually become connected to one of the two "hot" lines.

I am indebted to Ralph Bennet, of the General Electric Co., Cincinnati, for most of the information in connection with this last scheme. We are just now trying to work out the details and are hoping to find that it will be the best all-around answer to the problem of protecting low-voltage portable distribution systems. I should like to point out, however, that it has not had any official approval as yet, and I merely present it here as food for thought.

LOADER TONNAGE was boosted 42 percent through tracklessmining equipment. Output per crew man went up 80 percent.

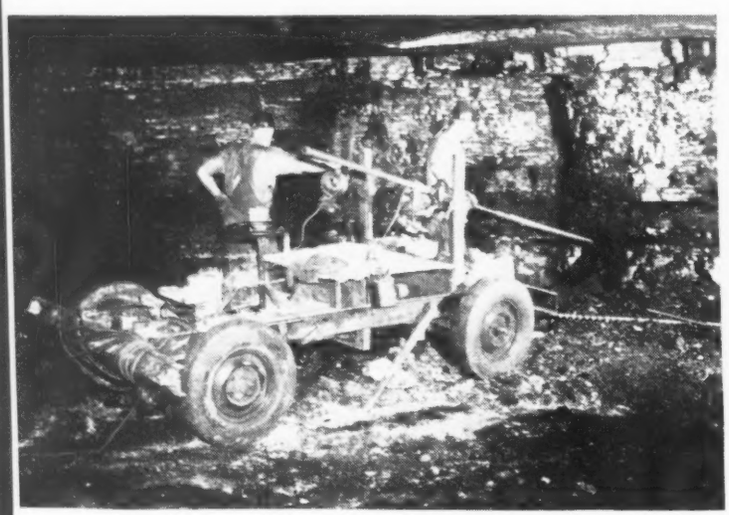
Safety and Production Lead

Drillholes Vent Gas From Sealed Workings — Trackless Mining Trial Boosts Loader Tonnage 42 Percent — Output per Man up 80 Percent — Air Used to Break Coal

By A. L. ROBERTS
General Superintendent, The Franklin County Coal Corp., Royalton, Ill.

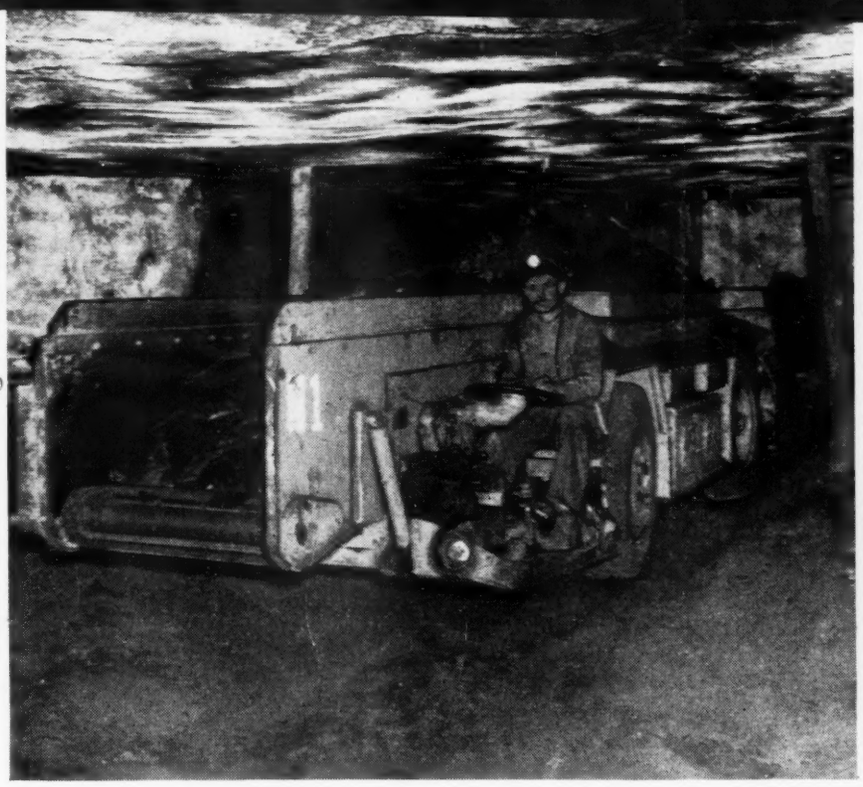
And R. R. RICHART
Associate Editor, Coal Age

VENTING GAS from old workings through vertical drillholes, converting from rail to trackless mining at the face and changing to air for coal breaking are changes that are beginning to pay off at the Royalton No. 7 mine of The Franklin County Coal Corp., Royalton, Ill. On the initial trial, the production from one loader served by two shuttle cars showed a machine increase of 42 percent and an improvement in tons per man shift of 80 percent, as compared to production by the same

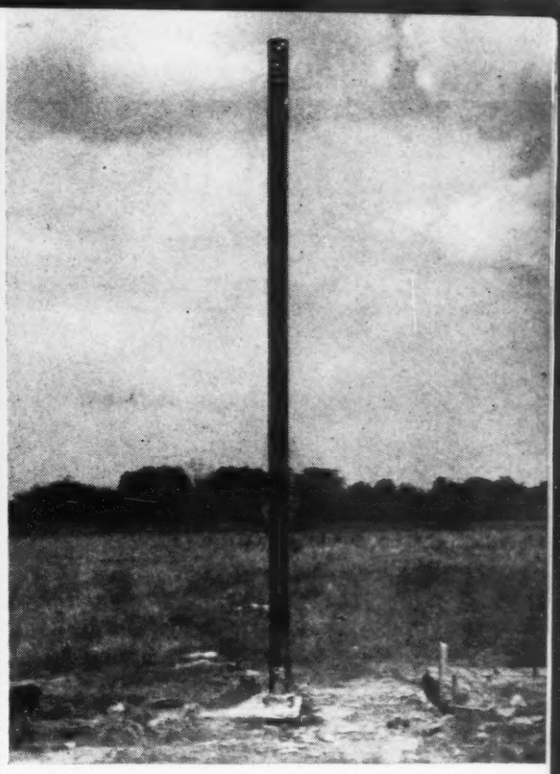


THE "ROBERTSMOBILE," a shop-built rubber-tired drill rig, operates from the 275-volt d.c. system and carries two drills.

TRANSFER-STATION loading increases pay load carried by each car. Operator controls the trip movements through a car hoist.



TWO 7½-TON SHUTTLE CARS, with hydraulic steering, serve one loader.



VENT PIPES bleed sealed territories.

Improvements at Royalton

crew in a similar territory in which track was used.

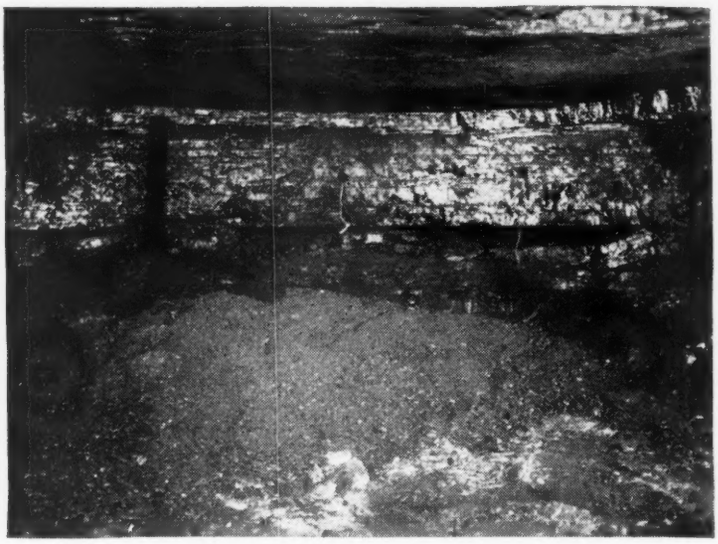
Early in 1946, special effort was directed at improving the mine ventilation. Air courses were cleaned and work begun on replacing the permanent stoppings, previously built of wood, with concrete blocks laid in mortar. Concurrently, drillholes were put down from the surface to release gas from old workings and thus reduce the pressure against the seals.

Six gas-venting drillholes have been completed to date. Each consists of a 6-in. hole with a 4-in. pipe incased in concrete. The pipe extends 20 ft. above the ground and has a solid cap over the end. The last 3-ft. section is perforated with ¼-in. holes to permit the gas to escape. There is a noticeable flow of gas from these vents, even in periods of low barometric pressure. Underground, it has been observed that the exchange of air through any leaky seal, in the territory thus vented, always is into the old workings, making it impossible to get a "cap" on the fresh-air side of the stopping. Methane readings in the present fresh-air workings, already have been reduced by 70 percent and management is working to lower the readings to 0.25 percent all over the mine. Eventually, every sealed area will be provided with at least one vent pipe. The average depth of the drillholes is approximately 300 ft.

Increased productivity from a trial operation of a trackless-mining

RUBBER-TIRED cutting machine keeps plenty of places cut. Each place is middle cut above the blue band and then center sheared. Tires on the cutter are gaged at 100 lb. at the compressor unit located near the mechanic's bench.

CRAWLER-MOUNTED loaders also operate in part of the rail-equipped sections at the Royalton No. 7 mine.



MIDDLE CUTTING and center shearing save explosives, up the prepared sizes, improve loadability and lengthen bit life.

section is helping to bear part of the expense of the safety-wise improvements underway at Royalton No. 7. Reducing the crew size from 21 to 24 men (depending on roof conditions), the standard in the track-equipped territories, to 15 to 17 men in trackless territories helped make the percentage increase per crew member double the rise in loading-machine tonnage. Loader production rose 42 percent for a 11 BU Joy when moved from a rail-serviced territory to one served by two Type 42E15 Joy shuttle cars. Men from the same crew that had operated the machine in the rail territory were assigned to the new territory where seam and roof conditions were precisely the same. Eliminating four trackmen, two cutting-machine men, two tripriders and adding one operator for the Type PL117E Joy elevator permitted the output per man, influenced also by increased loader tonnage, to rise 80 percent.

The 18-room territory, first developed for rail haulage, had to be altered for the trackless equipment and this hindered the trial operation in some respects. In the future (more of the trackless equipment is on order), the mining plan (Fig. 1) will consist of a 36-room panel with three transfer stations. The panel will be worked in 12-room sections. The 24-ft.-wide rooms will be driven 300 ft. deep and crosscuts on a 60-deg. angle will connect the rooms. Recovery in trackless-mined sections will be 60 percent, against 52 percent for rail areas.

In the present territory, approximately 7½ ft. of coal is taken, leaving 18 in. of top coal. Leaving top coal and using one row of props on each side of the room seems to be satisfactory from the standpoint of roof control. Management feels that systematic timbering as practiced in the Pittsburgh No. 8 seam, where the entire seam plus 12 to 14 in. of drawslate is taken and where

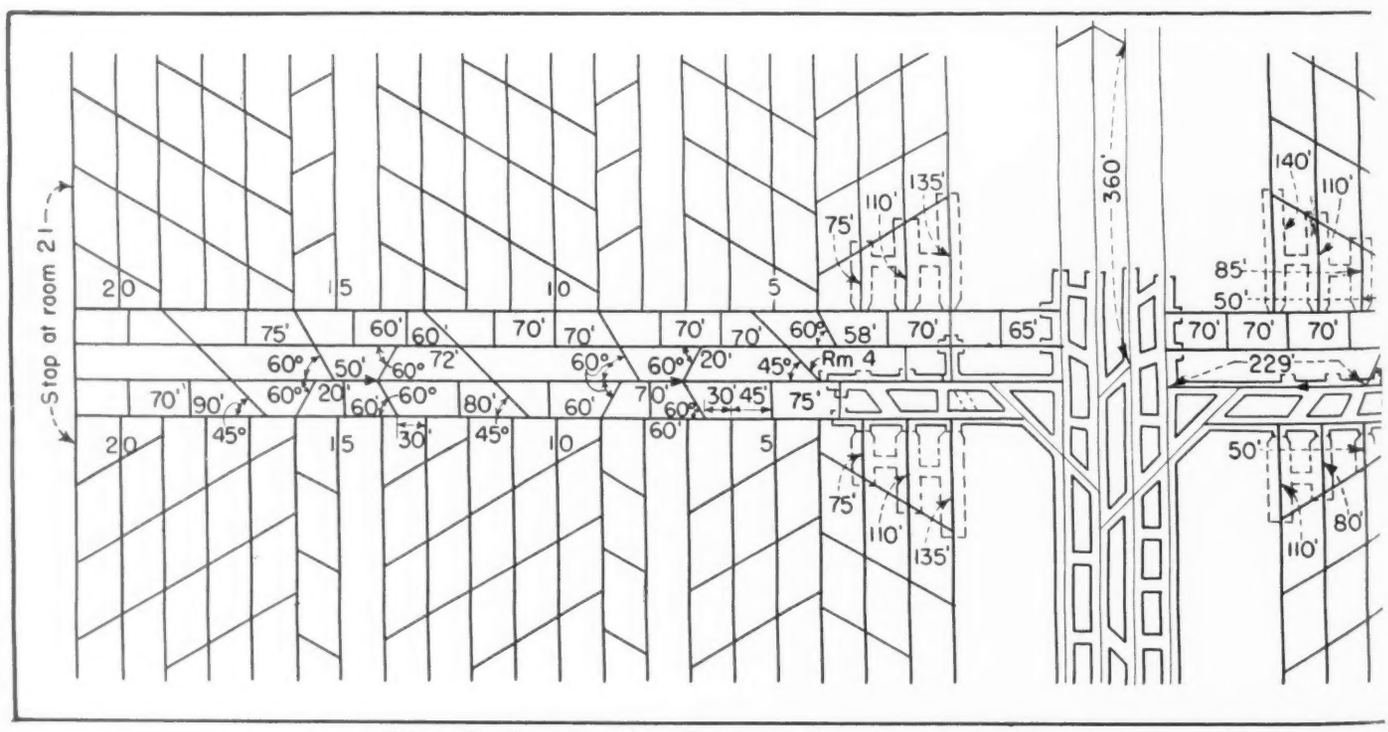


FIG. 1—Trackless-mining plan will increase coal recovery at Royalton No. 7 by 8 percent. Transfer

FIRECLAY is the only stemming used with permissible explosives.

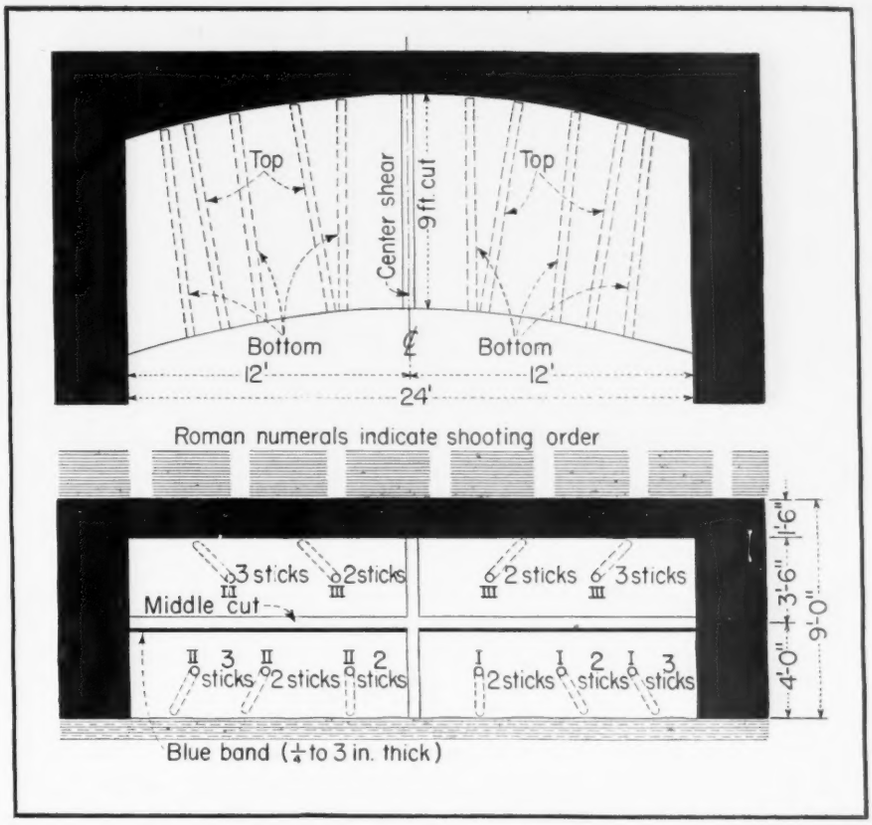


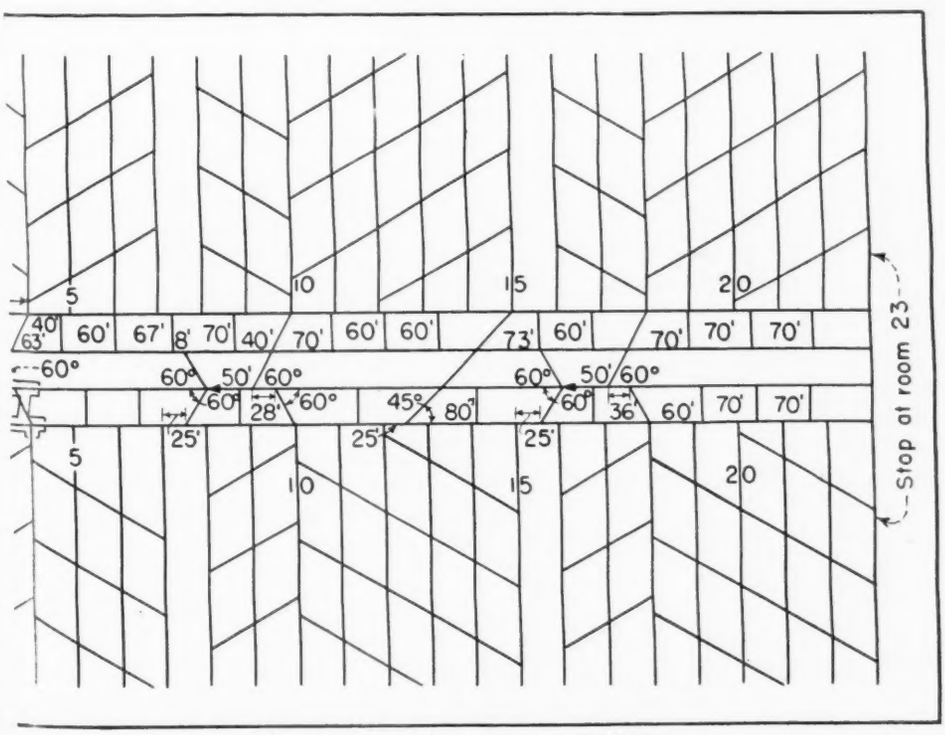
FIG. 2—Drillhole plan showing how the holes are charged and fired where permissible explosives are used in the trackless-mining section.

one crossbar is used per 8-ft. cut to support the roof, would not be practical in the Illinois No. 6 seam. Here, the character of the rock is such that the roof cannot be made to break at a definite line but instead rides over and breaks 35 to 40 ft. beyond the line desired. This means that the break would occur over the place where the next room ordinarily would be driven.

When bad local slips are encountered in the roof, the room is stopped and the spot timbered solid by cribbing. Afterwards, the room is reopened from the back through the next room and a cut-through is made to restore regular air movement. Management points out that with trackless equipment it is easy to go around bad places and bring the air through later.

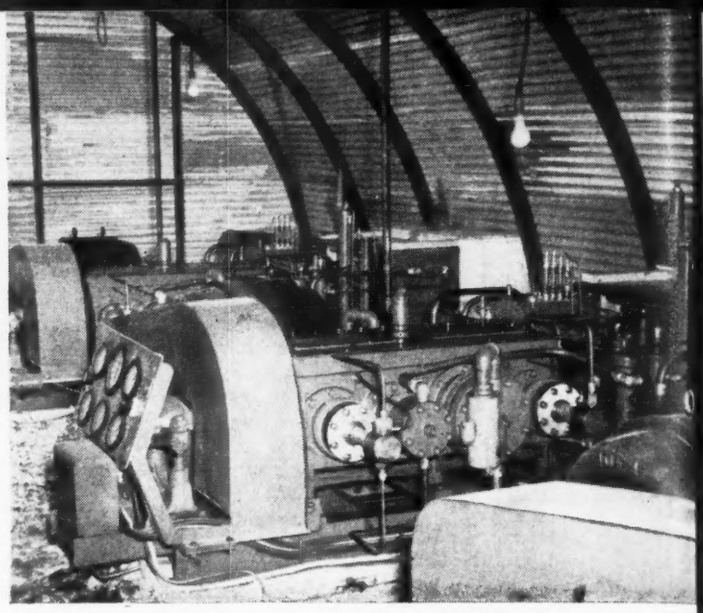
Better face preparation contributed to increased production from the loader. Using a Sullivan 10-RU rubber-tired cutter with a 9-ft. bar and regular bits to middle cut the face above the blue band (¼ to 3 in. thick) and to center shear (Fig. 2) is a departure for Royalton No. 7. Middle cutting the face permits the cuttings to fall clear of the cut where they cannot be dragged back by the chain and bits. This means that the cut always is well dusted. This eliminated bugdusting, which always has been a hard and very hazardous occupation. The middle cut, plus the center shear, provides each quarter section of the face with two more free faces for the shots to work toward. This leads to a higher percentage of prepared sizes, better loadability and reduced maintenance costs for loading machines.

A motor-driven pneumatic-tired drill carriage built in the mine shop helps the two drillers to keep up their work in the trackless section. Dubbed the "Robertsmobile," this

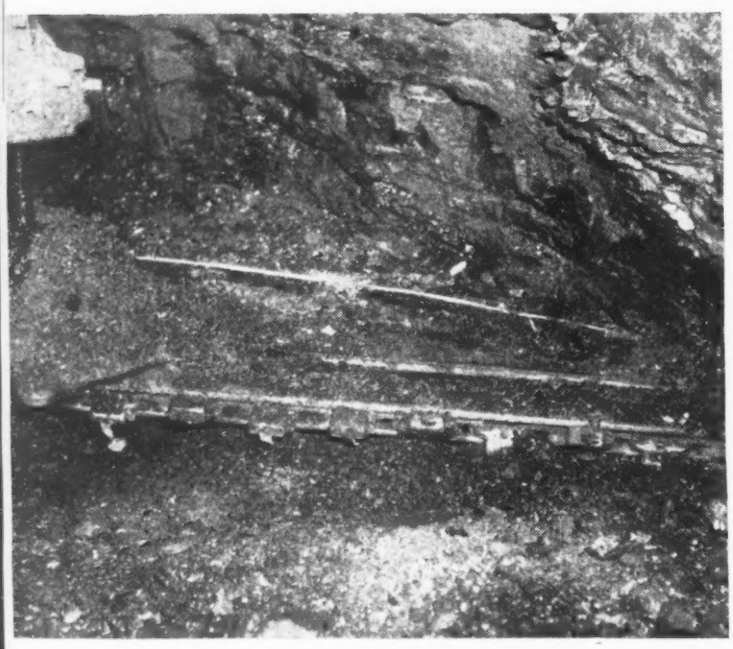


station occupies three locations before territory is finished.

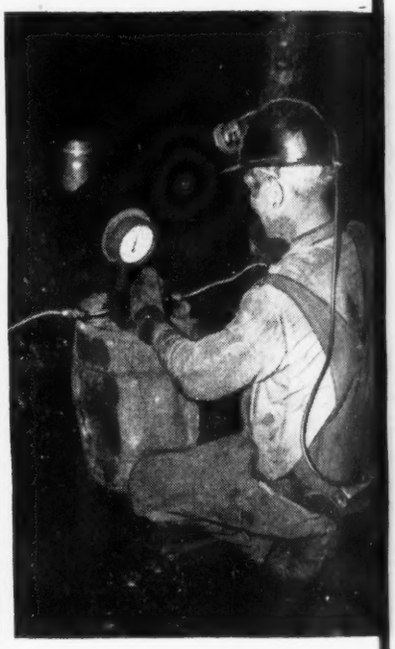
AUTOMOTIVE-TYPE gearing and anti-friction bearings conserve battery power for this 6-ton battery locomotive.



COMPRESSED AIR at 10,800 lb. is piped underground for dislodging coal at face. Automatic blowdown is provided at compressor.



CUTTING DUST is allayed through the use of water on the cutter bar. Each track-mounted cutting machine carries a water tender and pump. Sprays are to be added to the rubber-tired cutter.

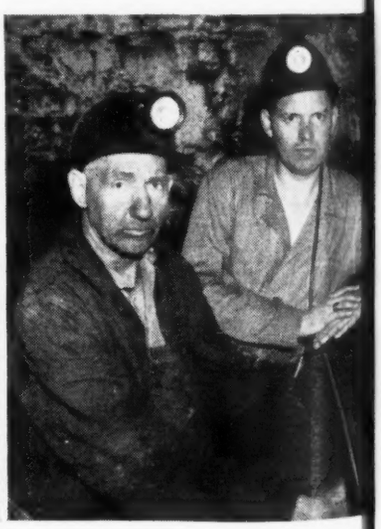


AIR-BREAKING tube (left) is used over and over. Holes are broken from bottom to top. After charging (right), release of line pressure permits the tube to release its air to break down the coal.

A. L. Roberts, general superintendent.

Thomas Young is section foreman for the trackless section.

Howard Roberts, transitman, in front of a typical stopping.



Clyde Pyles, Paul Hall, assistant foreman and engineer.

carriage has two drill posts over the back axle from which Dooley drills are operated simultaneously. Fig. 2 shows the drilling plan, how the holes are loaded with du Pont permissible explosives and the order in which they are fired with electric caps. Fireclay (incombustible) stemming is used in all holes.

Shuttle-Car Roads Maintained

The fireclay bottom is suited to shuttle-car operation. An occasional dragging, generally twice a week, and an application of calcium chloride keeps the travelways in good condition and controls the dust. Each shuttle car hauls a 7 to 7½-ton load and is of the two-wheel chain-drive, two-wheel hydraulic-steer type with an elevating front end. Each car, one a right-hand drive and the other left-hand, carries 520 ft. of No. 6 two-conductor cable.

The normal 15-man crew for a trackless section consists of a cutting-machine operator and helper, loading-machine operator and helper, two drillers and a tamper, one shotfirer, two shuttle-car operators, one elevator operator, one timberman, a swing motorman and trip-rider and a section boss.

Royalton No. 7 is moving toward complete conversion from permissible explosives to Airdox for breaking down the coal at the face. The three main reasons are: (1) eliminating the hazard of shooting; (2) reducing dust in suspension; (3) increasing the quantity of prepared sizes. Management still is convinced that permissible explosives, charged, stemmed and fired in a permissible manner, are safe explosives. Nevertheless, it has been demonstrated that getting the cooperation to keep the operation permissible is a difficult job.

Some of the practices resulting in windy shots, leading to possible dust explosives, are covered by recommendations based on the Federal Mine Safety Code and recently were listed in the Bureau of Mines' final report of the Centralia explosion, which included the following: "Unless all shots are fired in series or in group series, an examination should be made of each shot, before it is fired, to see that it has a burden in all directions of at least 18 in.

"If groups of shots are fired in series, an examination should be made of each series, before it is fired, to see that all holes in the series have a burden of at least 18 in.

"Boreholes (drillholes) should be stemmed with at least 24 in. of incombustible material or at least one-half of the length of the hole should be stemmed if the hole is less than 4 ft. in depth."

Airdox, the only on-shift "shooting medium" recognized by Illinois, employs compressed air at 9,500 to 10,000 lb. pressure to break down the coal at the face. Air is compressed to 10,800 lb. pressure by eight-cylinder six-stage compressors (three working in multiple at this operation) located on the surface about three miles from the main shaft. Moisture and oil are trapped and discharged from the line before the air enters the distribution system through a borehole. Air is piped to the working sections in 10-ft. lengths of thick-walled seamless tubing with thick-walled valves stationed at all important junctions. To facilitate the distribution of the air in the actual working section, heavy-walled seamless copper tubing is used.

In the sections using rail haulage, where the conversion to Airdox already has been made, the face preparation procedure is as follows: (1) the face is undercut; (2) the face is drilled with a 4-in. auger —eight holes for heading work and ten for rooms; (3) the coal is broken down by the Airdox tube, one hole at a time, beginning with the bottom holes.

One Man for Air Breaking

One man on each run takes care of dislodging the coal with Airdox. His control valve and gage, as illustrated elsewhere in the article, is at least one crosscut back of the face to be dislodged. He begins the operation by placing the Airdox tube in one of the bottom holes, pushing it to the back of the hole and then pulling it forward 5 or 6 in. The diameter of the tube is about ½ in. less than that of the drillhole. The tube is not wedged or tamped in place but rests free in the hole. Returning to the control station in the crosscut, he charges the tube and line to full line pressure. In 5 seconds or less the tube is charged and the sound of air passing through the valve stops. After calling out "Airdox," he turns the valve handle to atmosphere, which releases the pressure on the newly charged line. The sudden drop in pressure causes the ball bearing-type valve in the tube to open and release the air from the tube at the back of the drillhole. The angle at which the air is expelled from the shell reacts to hold the shell in the hole; therefore, no tamping or stemming is required. Air at approximately 950 atmospheres expands and breaks down the coal.

The tube is easily recovered by pulling it from the shattered hole and the operation is repeated for the other holes. The life of the ball-bearing valve is thousands of operations. This operation, of course, may be carried on while a loading machine is working in the next room.

Other equipment not already mentioned but which is helping to produce the 5,000 ton-a-day output at Royalton No. 7 are Goodman cutting machines (shortwall and track-mounted units), Goodman 460 and Joy 7 BU loaders, Greensburg "Monitor" 6-ton battery locomotives (Philco and Exide-Ironclad batteries), seven 6-ton General Electric gathering locomotives and six Goodman 13- and 15-ton mainline haulage locomotives. Timken-bearing-equipped mine cars have been used at this operation since 1923.

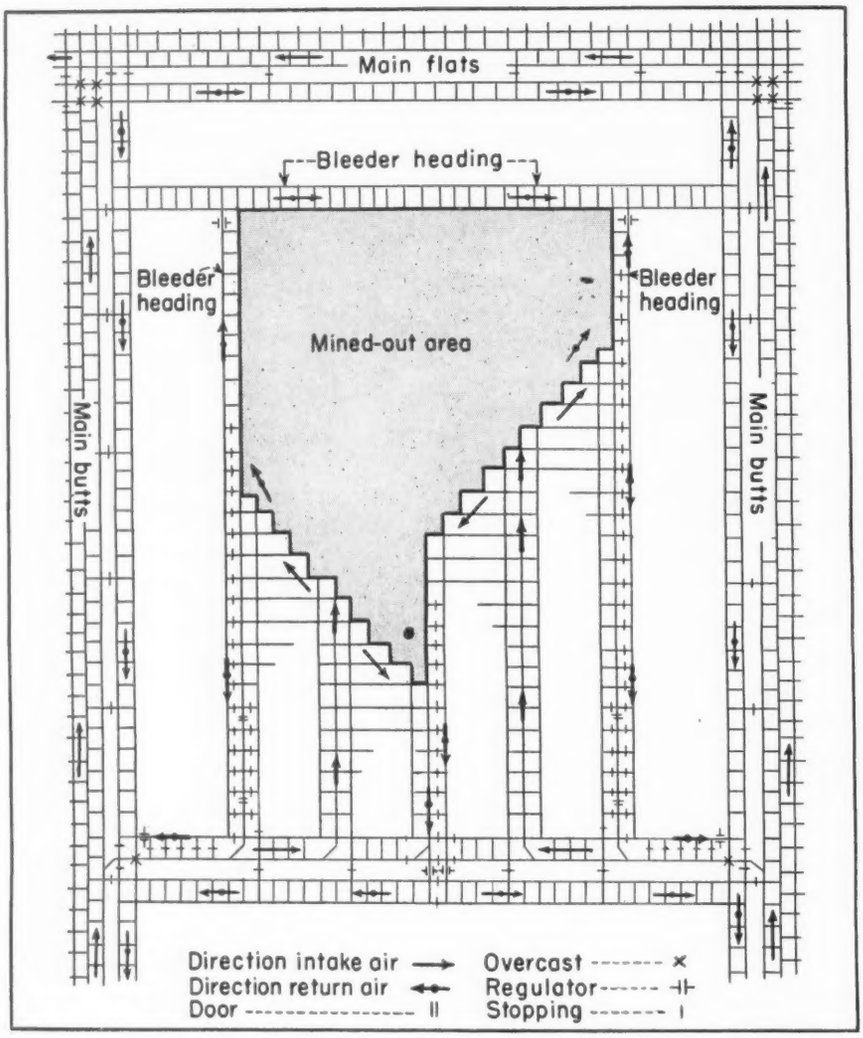
Quonset Hut for Compressors

Five power-conversion sets consisting of General Electric and Westinghouse m.g. sets supply d.c. power for all underground operations. Recently, a 500-kw. General Electric set was moved to a new surface substation next door to the Quonset hut housing the Airdox compressors, some three miles northwest of the main shaft. Most of the future work lies in this general direction, where the seam finally increases to 12 ft. Additional preparation facilities are being installed by Roberts & Schaefer to handle the extra tonnage anticipated.

Shortly, a 1130-hp. General Electric hoist, complete with metal-clad switchgear and Amplidyne control, will take over the hoisting assignment from a steam hoist. Power for the new hoist will be purchased from the Central Illinois Public Service Co.

Officials of The Franklin County Coal Corp. with headquarters in the Field Bldg., 135 So. LaSalle St., Chicago, are: E. R. Keeler, president, and H. H. Taylor Jr., vice president. In the operating department at the mine are: A. L. Roberts, general superintendent; Chas. Young, chief engineer; Walter Young, mine superintendent; Ed. Spiller, mine manager; Guy Biby, mine electrician; John Ross, top foreman; and Henry Kinsman, preparation manager.

Providing Bleeder Headings



HOW A PORTION of a mine might be ventilated by bleeder headings.

How Bleeder Headings Function—Their Advantages and Disadvantages—Advantages Include Safety, Practicability and Better Ventilation Control

By GEORGE H. SAMBROOK
Safety Director, H. C. Frick Coke Co., Pittsburgh, Pa.

THE ADVISABILITY of providing bleeder headings for gob areas is a subject which, because of its intimate relationship with the lives and health of mine workers, should receive the close, personal attention of the members of the safety, engineering and operating departments of any coal company.

Perhaps the first step in determining the advisability of providing bleeder headings for gob areas in any mine should be an analysis of the adverse elements expected to be encountered in mining operations, to determine the nature of such elements and the possible effects upon the lives and health of persons working in air currents that may be affected by such elements. In other words, what is the good to be derived from bleeder headings if we do provide them, and the possible loss to be sustained if we do not provide them?

In mining out portions of a coal seam without the use of bleeder headings, the ventilation of such portions must necessarily be confined to what is commonly referred to as a face sweep. Such a system of ventilation in a section of a mine where explosive or noxious gases are produced in dangerous quantities may present a problem in the removal of possible accumulation of such gases on rib falls or gobs in the vicinity of active working faces. It is in these cases that the advisability of bleeder headings becomes a prime question.

Methane gas is freed from the coal and associated strata as the work necessary to remove the coal from the coal bed proceeds. Where complete recovery of the coal is the practice, the removal of the coal will naturally be followed by a fall of roof strata to an extent peculiar to the geologic condition of the region in question. Where partial recovery is the practice, the worked-out area may or may not be subject to falls. In either case, the bleeder heading may be necessary to prevent accumulations of gas in the worked-out territory adjacent to active working faces.

Gas Volume Unpredictable

The first fall of roof that occurs will affect, in all probability, only the roof material between the coal seam and the hard rock strata which may be encountered at varying heights above the coal seam. Inasmuch as the overlying strata is not of the same structure in all mines, or in all portions of any one mine, in which complete recovery is practiced, the extent to which the coal seam must be removed before the stronger rock will break is not readily determinable. This uncertainty in turn makes it impossible to calculate the extent of the open spaces between the fallen material and the hard rock strata above it that still remains in place. And if these open spaces are occupied by mine gases, their volume cannot be known.

Carbon dioxide may, in some locations, be generated in large volumes on gob falls or in other worked-out areas. When such areas can be approached and ventilated from

for Ventilating Gob Areas

only one side, this gas can escape from the worked-out area only by mixing with the air which flows along the rib-line coal faces and over the outby portion of the area mined out, leaving unventilated the greater portion of the latter area.

Value in Machine Mining

With the constantly increasing use of electrically-driven machinery in producing areas where complete cycles of face work are continuously in progress, the advisability of bleeder headings may well take on added importance. Owing to the rapidity of extraction with mechanical equipment, it is essential that a ventilating system be provided that will avoid the potential hazards inherent in permitting the accumulation of explosive and/or noxious gases in mined-out areas. A system that provides bleeder headings would permit the gases liberated by coal and associated strata to escape into a current of return air in which they would be discharged to the surface atmosphere.

The fact that gases are subject to contraction and expansion during periods of high and low atmospheric pressure also may have an appreciable effect on the volumes of explosive or noxious gases confined in unventilated areas. In mines in which the mined-out areas are not extensive, little or no effect may be noticeable in the air currents ventilating the active coal-producing places in which men work. In mines containing extensive mined-out areas that are not ventilated, the expansion of gases into the air currents during periods of low atmospheric pressure may be of such extent as to pollute the ventilating currents in the mine to the point that they will contain a dangerous concentration of explosive or noxious gases.

A portion of a mine provided with bleeder headings is shown in the accompanying illustration. This sketch does not show a section of an actual mine but was prepared for the purpose of illustrating the advantages of ventilating mined-out areas by means of bleeder headings.

The illustration shows main entries divided into groups of intake and return headings in which the air currents are separated by stoppings. The panel development in advance of the fracture line is based on the three-heading system, the center heading being the intake airway and haulage road with a return airway on each side. The mined-out area is provided with bleeder headings along the left and right sides and the top; thus, the air can be coursed through all or a part of the mined-out area into these headings and thence into the main return.

Each section is ventilated by intake air currents that travel from the center of the fracture line in opposite directions across the face workings to the point where they enter the bleeder headings or return airways. The purpose served by the step between the two rib-line sections is to maintain positive control of the air currents that ventilate the lower portions of these sections.

Gas Cleared From Mined Areas

When bleeder headings are employed in a mining system, as represented by the sketch, they render valuable service in keeping mined-out areas in the vicinity of the working rib line free of explosive or noxious gases by enabling positive coursing of the air current as the rib line advances.

After the panel shown is mined out, bleeder headings will continue to serve in preventing the accumulation of gas in the area as the development of the mine progresses.

After the main entries have reached their limits and the extraction of the main-entry pillars is in progress, these same bleeder headings will provide a return airway close to the gob lines. It is essential to ventilate old gob areas in advance of the retreating rib lines. If the earlier mining failed to include bleeder headings, new return airways must be driven in later operations to accomplish this purpose. Also, since the bleeder headings are supplementary to the return air courses, they offer an additional benefit to the ventilation system throughout the life of the mine by reducing the velocity in substantial extensions of the return airways.

It will be noted on the sketch that the stoppings in the crosscuts between the bleeder heading and parallel heading next to it were removed as the retreat work in the panels moved toward the main development entries. The stoppings left in place serve as a controlling factor in keeping a portion of the air current moving over the gob area before it enters the bleeder heading or return airway. They perform this function by regulating the air flow in the splits and by keeping the gob area under constant ventilating pressure. To insure a normal flow of air in the splits, daily observation is essential so that necessary adjustments may be made at the proper time and place.

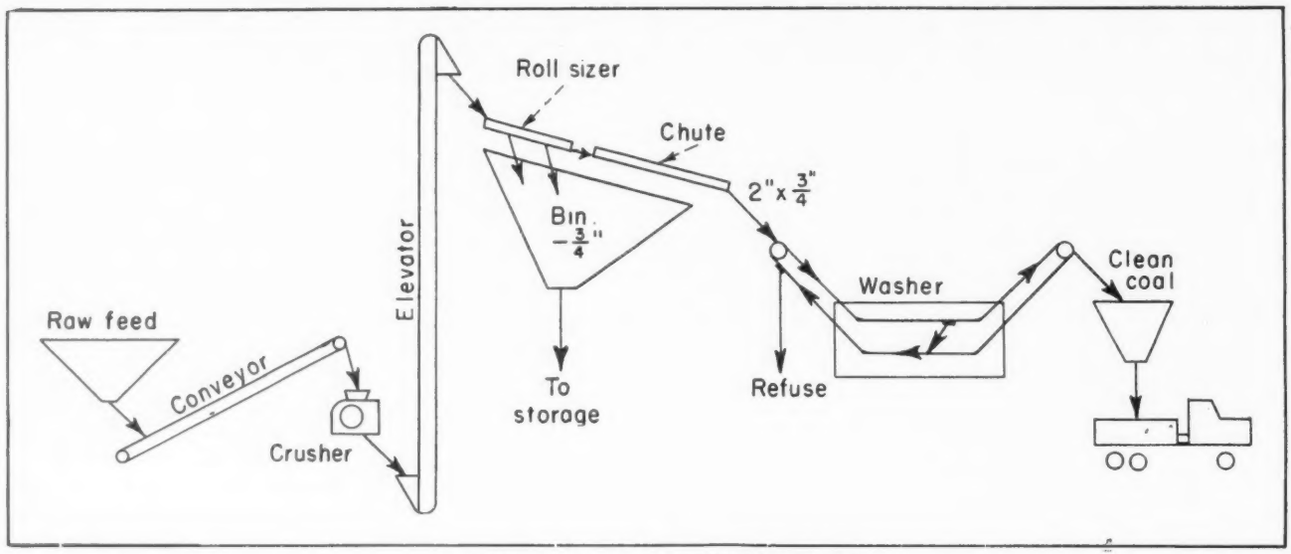
Maintenance Highly Important

In the operation of mines, if explosive gas is liberated from the coal measures to the extent that the use of bleeder headings is advisable, it is highly important that such bleeder headings be kept free of fallen material or accumulations of water.

The importance of keeping bleeder headings in condition to pass a sufficient quantity of air to dilute, carry off and so render harmless any possible inflow of gases is one which must be fully realized by mine management if the best interests of safety are to be served. Moreover, due consideration should be given to the advantages of driving an additional bleeder heading parallel to the one next to the gob, the two headings to be connected by open crosscuts through which the air may cross from one bleeder heading to the other should either be temporarily thrown out of service for any cause. This question is one which will be determined, in all probability, by the nature of the roof immediately over the coal seam and the area necessary to pass the required amount of air.

It may be concluded from the foregoing description of the bleeder heading system of ventilation that, under certain conditions, the advantages pointed out indicate a real need for this method. It provides a safe, practicable and economical method of ventilating active working faces and nearby worked-out areas. Moreover, it provides a degree of ventilation control over sections of old workings to a greater extent than is afforded by other ventilating systems.

Abstract of a paper presented at the 1947 meeting of the Mine Inspectors' Institute of America.



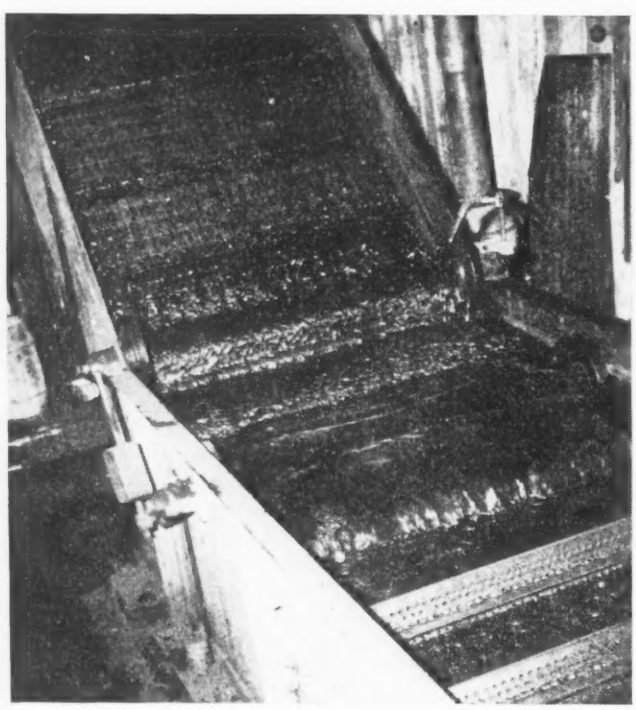
FLOWSHEET—SIX K RECLAMATION PLANT.

Washer Reclaims Bank Coal

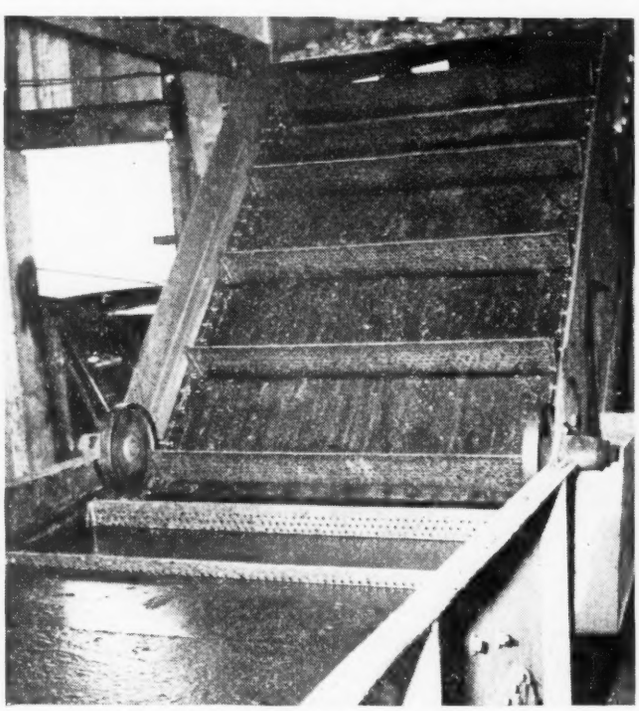
Six K Plant Built to Recover 20 Tons or More per Day From Bituminous Tipple, Mine and Bank Material—New-Type Washer Insures Quality Equalling or Exceeding Deep-Mined Output

A CONTROLLED-QUALITY COAL from mine refuse, picking-table reject and bank material, equal to or better than the regular deep-mined product is the objective of a new crushing and washing plant recently put into service near Clarksburg, W. Va., by the Six K Coal Corp. Six K is headed by A. R. Kincaid, Clarksburg, and ships over the Baltimore & Ohio.

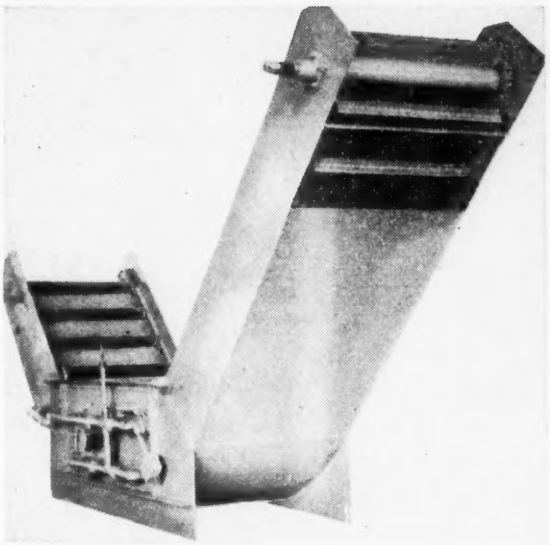
Designed also for experimental work and testing with the new Crescent coal washer, developed by the Coal Cleaner Co., Clarksburg, the Six K plant was built to recover eventually some 200 or more tons of clean coal per day from approximately 600 tons of tipple, mine and bank material. Operation of the washer is adjusted to provide a



SIX K WASHER in operation. Cleaned coal is dewatered on the inclined screen section at the rear.

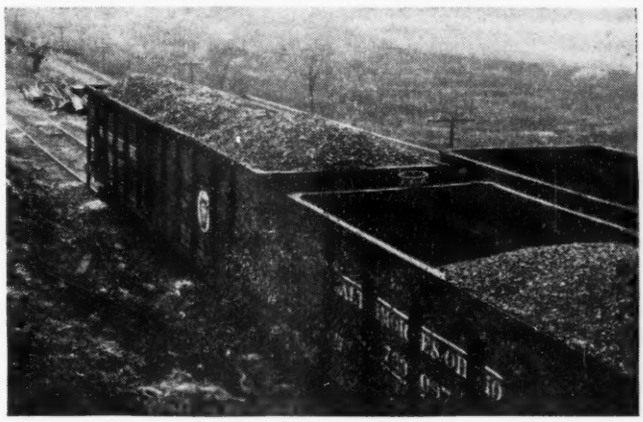


FEED END of the Six K washer. Refuse is dewatered and discharged on the conveyor run under the incline.



FACTORY VIEW of the new-type washer at Six K. Gravity is provided by calcium chloride or other mediums.

RAW MATERIAL for the Six K plant as it appears in the feed bin. The coal percentage is 30 percent or more.



SIX K PRODUCT ready for shipment—equal to or better than the regular deep-mined product.

CHARLES E. POOL (left), Coal Cleaner Co.; G. D. Stout, Six K plant superintendent; and G. M. Furner.

cleaned product equal to or better, as stated, than the regular deep-mine output.

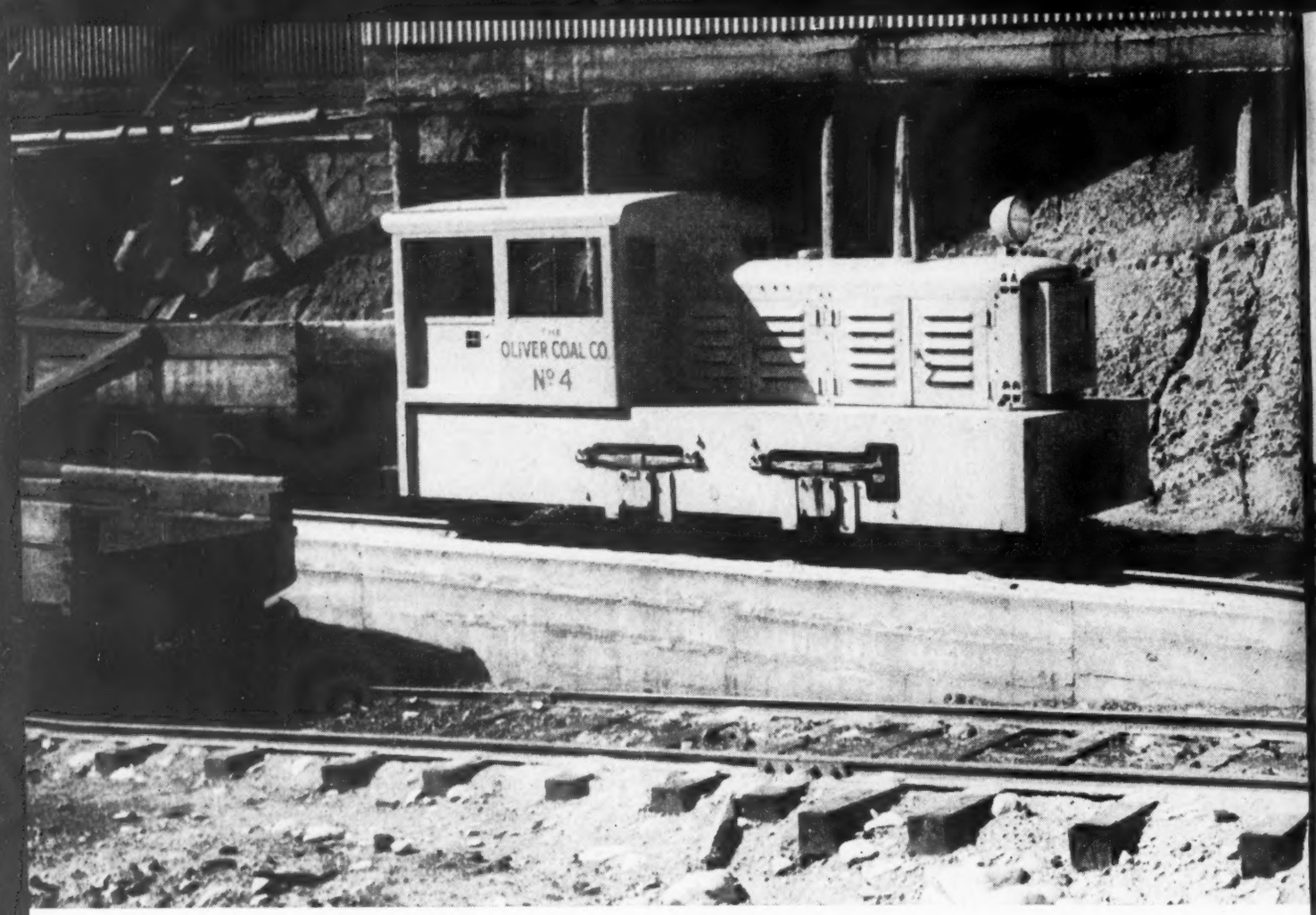
The Crescent washer employed is the standard model with a rated capacity of 50 tons per hour feed. It is 50 in. wide and 22 ft. long overall. The washer gets its name from the shape of the continuous flight conveyor handling coal and refuse. On its way into the washer, the raw feed is lowered into the washing medium on the top run of the conveyor. Calcium chloride, with the gravity raised or lowered as necessary to give the desired quality of product by adding chloride or water, is used at Six K. However, the washer is designed to use other mediums, such as fire clay and garden soil, providing a suitable gravity. As the conveyor moves through the bath, the coal floats to the top and is carried to the discharge end—an inclined section equipped with Wedge Bar screens for dewatering. Solution removed by the screens flows down the trough accommodating the lower, or return, run of the conveyor back into the bath, to which chloride or water is added as required to maintain the desired gravity.

In passing through the bath, the refuse drops to the bottom of the conveyor trough and is moved to an opening. It falls through this opening to the lower, or return, run of the conveyor and is carried back to another inclined dewatering section at the feed end of the washer. Thus, one conveyor takes care of all the material-handling functions. At the time this article was prepared, other Crescent washer installations included two for coal and one for reclamation of bituminous coal from banks and other reject.

The main source of material for the Six K plant is a 200,000-ton bank. Tests show that this bank, consisting of pickings and material resulting from cleaning up falls and the like in the mine, which uses loading machines, runs 30 percent or more recoverable coal. It will be picked up at a rate of about 500 tons per day by a shovel and trucked to the feed bin at the new reclamation plant. Pickings and mine material, running about 80 tons per day, are brought to the same bin. From the bin, the material is conveyed to a Jeffrey 30x30 single-roll crusher. Being adjustable, the crusher can be set to break the feed to minus 2 in., or other desired size.

From the crusher the feed at Six K is elevated to a Norman roll-type sizer, which takes out the minus ¾-in. fraction. At present these fines drop into a bin, from which a larry removes them to storage, pending installation of cleaning equipment now under development to prepare them for market. The plus ¾-in. goes over a shaker chute to the washer. After being cleaned, as previously described, the coal goes into pockets from which it is trucked to a railroad-car loading ramp.

Simplicity and low operating cost are features of the Six K and similar plants. The crew at Six K consists of three to four men.



DIESEL LOCOMOTIVE temporarily used in main-line haulage by The Oliver Coal Co., Somerset, Colo.

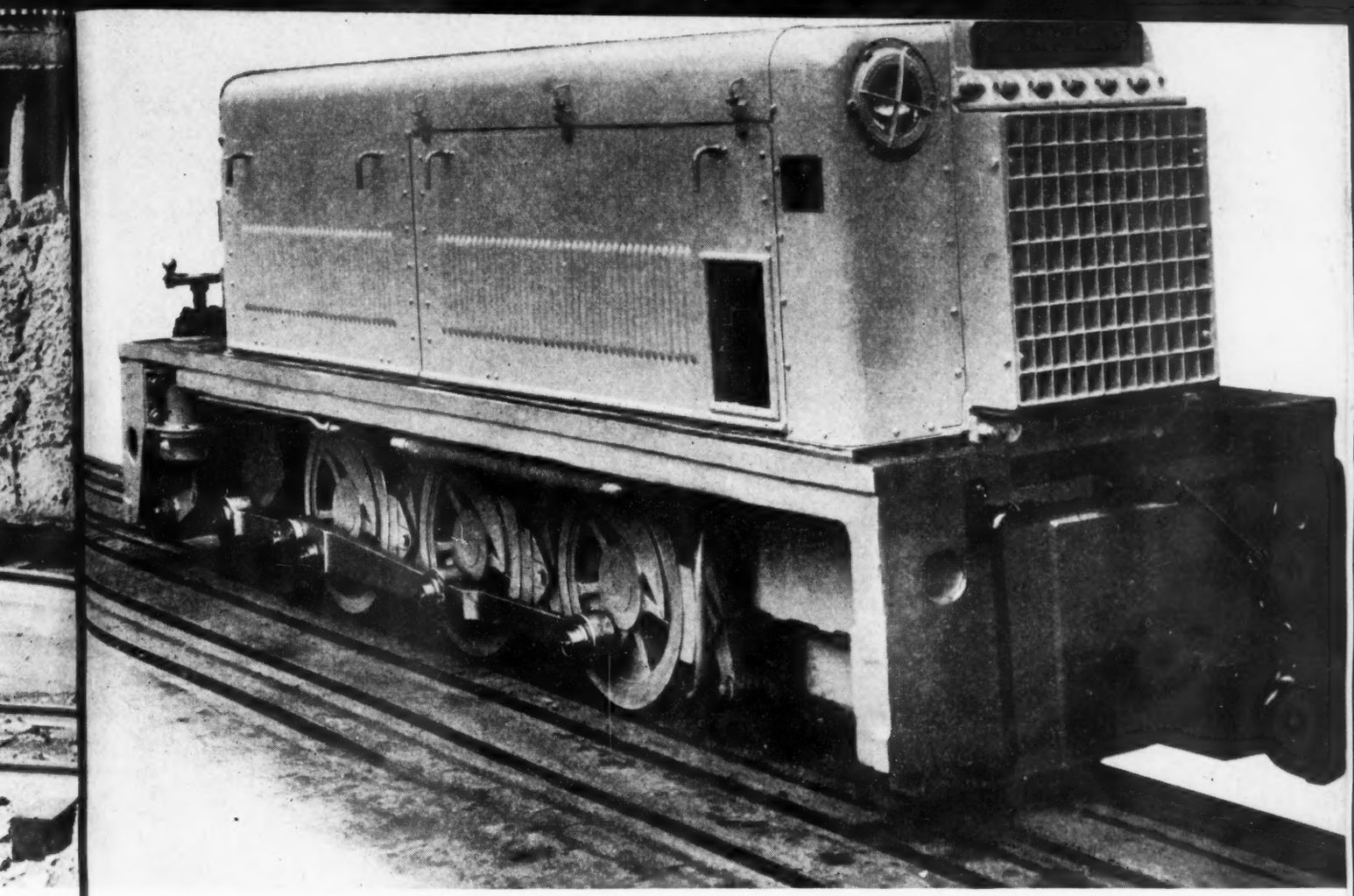
Diesel Locomotive—Coming

Already Widely Used for Underground Haulage Abroad, Diesel Locomotives Are Receiving Serious Consideration for U. S. Coal Mining — Advantages Include Greater Safety and Lower Operating Cost

WIDELY USED in coal mines on the Continent and in Great Britain, the diesel locomotive, suitably equipped, is receiving serious consideration for underground service in the United States. Establishment of standards for the design and testing of diesel locomotives and their certification for mining use was announced by the U. S. Bureau of Mines in 1944. Until May, 1947, only one trial of a diesel locomotive —an open-type unit for outside switching—had been made underground in a coal mine in the United States. The results were good even though the locomotive was not designed for underground service nor equipped with the devices considered necessary for safety. Diesel locomotives and diesel trucks, however, have been used underground in metal and non-metallic mines and in tunnels in the United States for several years.

While the diesel locomotive introduces the problem of making it safe for underground use, it offers a number of real advantages. Practically all of these flow out of elimination of the trolley system. While there is little present indication of the exact cost of diesel locomotives designed and equipped to meet Bureau standards, there is little doubt that, for a time at least, this cost substantially exceeds that of comparable trolley types. In exchange, however, the operator would be relieved of the cost of an overhead trolley system and substations to feed it, as well as the cost of installation and of maintenance.

The cost of maintaining diesels probably is somewhat higher than that of electric locomotives. In the absence of experience that would provide the necessary data, only a surmise can be made as to relative fuel and electricity costs, but there is little indication that fuel will be very much higher, and it could be lower. Speed, starting torque, acceleration and other factors also enter the picture and data on these, under conditions comparable to coal-mining service, are scarce. But, weighting these supplementary considerations heavily, the operator starts with a major saving in trolley wire and substation capacity, as well as the cost of their installation and maintenance. Aside from installation, operating and mainte-



BRITISH "HUNSLET" 100-hp. flameproof diesel locomotive for underground coal haulage (U. S. Bureau of Mines).

Underground Coal Hauler?

nance considerations, elimination of the trolley system and its appurtenances materially reduces the fire, ignition and electrocution hazards.

The exact role the diesel locomotive might play in underground coal transportation in the United States still is uncertain. However, it is, at present, largely being thought of as a main-line unit although it has been used for gathering abroad. Perhaps, as the diesel develops, it may also find application in gathering in the United States, although the need for larger volumes of air and other considerations are difficulties. However, for the operator desirous of displacing the trolley system completely, there is the battery haulage unit, which has not received the attention certain of its characteristics and advantages warrant, even though recent years have witnessed a large increase in battery-powered gathering, particularly with shuttle cars.

The open trolley wire and accompanying feeders in close proximity to coal, wooden doors and other combustible material is an ever-present fire hazard in coal mines, in addition to the possibility of gas or dust ignitions from arcs and sparks. Electrocution from contact with an open wire or feeder is a further ever-present hazard with trolley systems. The records show that their elimination or reduction would materially cut injuries and fatalities in mining, saving not only lives and suffering but also reducing compensation and other accident costs.

Diesel Exhaust Gases

But while the diesel locomotive offers real advantages, it, itself, requiries proper design, protection and operation. The hazards to be protected against include flame or sparks and toxic or irritating compounds in the exhaust. The principal constituents of exhaust gases from a diesel engine are:

1. Carbon dioxide. Because the presence of 0.5 percent of carbon dioxide is reflected in deeper breathing, the Bureau of Mines recommends that the carbon-dioxide content of mine air be kept at less than that figure, although a diesel engine can be operated safely where as much as 1 percent is present.

2. Carbon monoxide. This gas is extremely dangerous to breathe and 0.20 to 0.25 percent produces unconsciousness in about 30 minutes. Normally, a properly adjusted diesel engine produces much less carbon monoxide than a gasoline engine, and the Bureau of Mines states that under such conditions the amount of carbon monoxide in the exhaust gas can be diluted and removed safely by having a reasonable amount of ventilating air in the underground workings. Careful control of fuel injection keeps down carbon-monoxide production.

3. Oxides of nitrogen. While an atmosphere containing 0.5 to 1.0 percent carbon monoxide is fatal with less than 30 minutes exposure,

as little as 0.07 percent oxides of nitrogen may result in death in the same length of time.

4. Aldehydes. These are produced by incomplete combustion of the hydrocarbons in the fuel. They are responsible for the only odor detectable in the diesel exhaust. While they are not particularly dangerous, they also are extremely irritating in very small percentages. For that reason it is impossible to breathe air containing sufficient aldehydes to be dangerous, unless the man cannot get away. Keeping the percentage down, therefore, is primarily a matter of comfort.

5. Oxides of sulphur. While very poisonous, sulfur dioxide is so irritating to the eyes and respiratory system that men will not stay in an atmosphere containing a dangerous percentage unless they are prevented from escaping.

6. Oxygen. The oxygen content of the diesel exhaust always is relatively high because of the excess air necessary for complete combustion of the fuel oil. However, the engine consumes oxygen from the air and this must be replaced by ventilation. The Bureau of Mines recommends that mine air contain at least 20 percent oxygen in the working sections.

Three Hazards Involved

Safe operation of diesel locomotives underground, therefore, involves taking care of three possible hazards: fire (fuel oil, coal or other combustible material touching or near the locomotive); gas or dust ignition from the engine exhaust or electrical equipment; and toxic or objectionable gases. Ways of taking care of these hazards include the following:

1. Flame arresters on the air inlet and exhaust, and flame proof joints and openings for the entire combustion system. This is the major item in the increased cost of the diesel for mine service.

2. Exhaust-gas treating equipment which, in addition to cooling the exhaust gas below the ignition temperature of methane, absorbs part of the toxic gases, removes smoke and odorous or irritating constituents and should dilute the remainder with large quantities of fresh air (30 to 40 times the exhaust volume) before the exhaust finally goes into the atmosphere. Water baths and sprays with labyrinths and baffles are the most used exhaust-treating facilities, not only for cooling gases and removing objectionable constituents but for arresting flame and sparks as well.

3. Careful operation and good —really good—maintenance.

Ventilation is emphasized in diesel-locomotive operation. Not only must the ventilating air supply the oxygen used up by the engine, it also must dilute and carry away the toxic or objectionable products, keeping the percentages below injurious limits. Increased carbon dioxide in the air increases the carbon-monoxide content of the exhaust, as well as the percentage of aldehydes and other irritants. Methane in the air also increases the carbon-monoxide and aldehyde content of the exhaust, in addition to its effect on engine speed and other operating factors.

Early German experiments demonstrated that an explosive methane-air mixture could be ignited from either the intake or exhaust of a diesel in the absence of flame arresters. It also was demonstrated that in a 5- to 9-percent methane-air mixture a diesel would continue to run after the fuel supply was shut off. For these and other reasons safety authorities strongly recommend that diesels be operated in practically normal air, which in turn necessitates better-than-average ventilation. In foreign countries, in fact, although exhaust-gas conditioners are required, emphasis is placed on extra ventilation.

Desirable Safety Features

Because of toxic gas, ignition and other hazards, some of the desirable features of diesel locomotives for underground coal-mining service are listed by the Bureau of Mines as follows:

1. Flameproof construction.

2. An exhaust-gas conditioner sufficiently large to cool the exhaust gas to less than 180 deg. F. under the most severe working conditions.

3. Use of a device to stop the engine automatically if the temperature of the exhaust gas exceeds 180 deg. F. at the point of discharge from the cooling system.

4. A chemical method of absorbing the aldehydes and oxides of nitrogen in the exhaust. Water absorbs the aldehydes but must be changed frequently to prevent saturation and loss of absorbent qualities.

5. A chemical method of converting the carbon monoxide in the exhaust gas or absorbing it. Most experiments to date have not been successful.

6. An exhaust-gas conditioner able to function efficiently one full shift without attention, such as changing water or adding chemicals.

7. Dilution of the exhaust gas with air after cooling and before discharge. This reduces the hazard from toxic gases to persons near the locomotive.

8. Flame arresters on both air intake and exhaust.

9. Flame-arrester design permitting quick, easy cleaning and replacement.

10. Non-corrosive flame-arrester materials.

11. At least two, and possibly three, independently operated brakes. Air brakes are desirable, as well as hand brakes.

12. Spring suspension providing maximum stability on rough, uneven track.

European Applications

The diesel engine was invented by Dr. Rudolph Diesel, a German scientist, in 1892. The first diesel mine locomotive for underground coal-mine service is reputed to have been installed in Germany in 1927. Diesels also went into service in French and Belgian coal mines soon afterward. Great Britain installed the first underground diesel unit in 1939 and, in April, 1946, 40 flameproof diesel units were reported in operation.

By 1938 Germany was reported to have in operation 533 mainline and 69 gathering locomotives powered by diesels. The total for all mine-line units was 2,918; gathering, 684. In 1939, out of 184 locomotives in Belgium, 114 were diesel. Underground locomotives in France in 1935 totalled 730, of which 357 were diesel.

Diesel locomotives now are manufactured in Great Britain in sizes of 2½ tons, less than 20 hp.; 4 to 5 tons, 20 to 25 hp.; 7 tons, 25 hp.; 10 tons, 50 hp.; 15 tons, 100 hp.; 20 tons, 200 hp. Plans also are under way for tandem units (two 100-hp. machines), operated by one man. Tests indicate a tractive effort of 16,000 lb. One 50-hp. British diesel, with a 30-in. track gage, has an over-all height of 5 ft.; width, 3 ft. 11 in.; length, 13 ft. Weight in working order is about 8½ tons. Tractive efforts are: first gear, 5,310 lb.; second, 3,420 lb.; third, 2,020 lb.; fourth, 1,300 lb. Based on a starting resistance of 18 lb. per ton and a running resistance of 12 lb., hauling capacity of the 50-hp. unit at various speeds and weights is:

Speed M.P.H.	Tons Hauled Level	1%	2%
3.00	286	124	76
4.66	276	91	52
7.90	160	50	27
12.25	100	29	14

A new-type Belgian unit features a worm drive. With a track gage of 23.6 in., over-all height is 5 ft. 3 in.; width, 3 ft. 6 in.; length, 17 ft. 6 in. The drawbar pull at 4.2 m.p.h. is 3,750 lb.; at 9.0 m.p.h., 1,540 lb. The load handled is 60 to 80 cars of about 1 ton each. Fuel consumption per 24 hours is 13.3 to 14.7 gal.

First Coal Use in Colorado

The first diesel locomotive used underground in the United States is said to have been placed in service in 1939. The first used underground in a coal mine was in the West at the Oliver mine of The Oliver Coal Co., Somerset, Colo. It went into service, with the special permission of the state mining department May 22, 1946, and was removed when the Krug-Lewis safety code went into effect because it was non-permissible. Diesel locomotives, however, were used to good effect, starting Aug. 7, 1939, in driving tunnels for the Delaware Aqueduct in New York.

Five diesels were employed in the Aqueduct work. They weighed 14 tons each and were powered by engines capable of delivering 160 brake horsepower at 1,600 to 1,700 r.p.m. Track gage was 36 in. and the locomotives were 15 ft. 9½ in. long and 6 ft. 2 in. high over-all. On hauls up to five miles with an adverse grade, 40 tons load per trip, the operating cost over one month was 2.22c. per ton-mile, including labor and all other expenses. Actual cost of the operation of the five diesels over a period of a month was: labor, $7,609; insurance, (at 15 percent), $1,141; fuel and lubrication, $429; repairs, $600; total, $9,779.

Switcher Put in Mine

In the one diesel-locomotive experiment in an underground coal mine in the United States (the unit, as noted, was removed after the Krug-Lewis safety code went into effect), an ordinary outside switcher put in service Nov. 11, 1944, was started on the underground run May 22, 1946, with special permission from state authorities. The Bureau classes the mine as gaseous. Thickness of the coal varies from 4 ft. 2 in. to 19 ft. 3 in. and the mine is developed by slopes driven up the grade, which averages about 6 percent in favor of the loads. Local rolls and changes in grade are severe.

Shuttle cars serve the loaders and coal is moved to the underground parting by a battery locomotive. Car capacity is 2.65 tons and the diesel handled eight cars per trip. Time for a round trip was about 12 minutes. Empties were pushed from the tipple upgrade to the parting and locomotive travel was limited to 1,200 ft. inby the portal.

The locomotive (see accompanying illustration) is equipped with a 40-brake-horsepower engine. The locomotive has five speeds ahead, ranging from 1.5 m.p.h. in first gear to 15.3 m.p.h. in fifth gear. Weight of the unit is 7 tons. The locomotive was not overhauled prior to being placed in underground service and engine wear was thought to be the reason why black smoke was exhausted while the empty trip was being pushed into the mine. The odor of aldehydes was not strong enough to be obnoxious and was quickly dissipated by the ventilation air.

In the belief that the locomotive was in need of overhauling, cylinder liners, pistons, etc., were obtained for this purpose. But on dismantling the engine, wear was found to be negligible. However, as long as the engine was torn down, it was decided to put in the new parts. When it was reassembled, however, it was found to smoke as badly as before.

Exhaust Smoke Barely Visible

During testing, the oil-bath air cleaner was removed from the intake. Smoking was reduced to a slight haze. This resulted in the theory that the difficulty was in the air-fuel ratio. Some change in this and in the air cleaner cleared up the trouble immediately. When the locomotive was inspected by federal and state representatives in October, 1946, a few days before it was removed from the mine, the exhaust smoke was barely visible and was causing no difficulty.

Haulage is on the intake and, when measurements were taken during the period of diesel operation, the air current was 37,000 c.f.m. near the portal and 20,000 c.f.m. inside near the end of the diesel run. Before the locomotive went into service, the main return showed 20.82 percent oxygen, 0.05 carbon dioxide and 0.12 to 0.22 percent methane. Analysis of the general mine air near the end of the run when the diesel was operating showed the following: oxygen, 20.89 percent; nitrogen, 79.02; carbon dioxide, 0.08; carbon monoxide, less than 0.01 percent; oxides of nitrogen, 7 parts per million (less than the 25 parts per million considered permissible by the Bureau and allowed by certain state laws).

A super-sensitive carbon-monoxide indicator was operated continuously while the locomotive made several round laps. The highest percentage noted while the locomotive was passing the indicator was 0.0035 percent (less than the usual permissible limit of 0.01 percent). The indicator reading immediately dropped to zero after the locomotive passed.

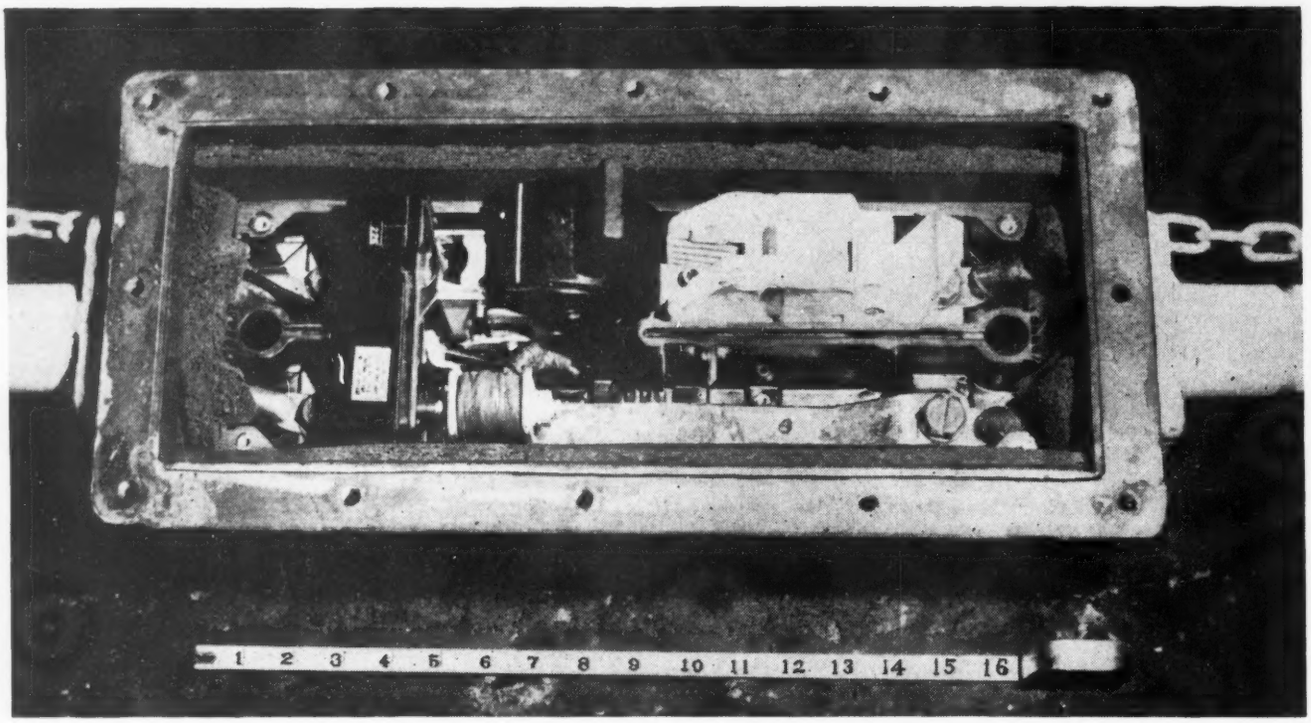
Samples also were taken of the exhaust gas while the engine was idling after pushing empties into the mine. They showed the following: oxygen, 18.44 percent; nitrogen, 79.73; carbon dioxide, 1.76; carbon monoxide, 0.03; methane, 0.04; oxides of nitrogen, 39 parts per million.

Broad Application Possible

Although the first diesel locomotive for underground coal-mining service is yet to be submitted to the Bureau of Mines for test and approval, experience not only in this country but abroad proves that they can be operated safely and provide real advantages through the elimination of the cost and hazards of trolley systems. The coal mines of Europe, while worked differently, encounter the same hazards of gas and coal dust. Use of diesels in European mines for both main-line and gathering purposes is a good indication that they are reasonably safe in gaseous mines if kept in good repair, operated properly and accompanied by good ventilation to keep the methane content down and the percentage of toxic gases within safe limits.

Design is still a major but not insurmountable problem, with development of models for thin-coal operation a must item. In addition to greater safety, the evidence indicates that when diesel haulage begins to grow, a substantial cost reduction also will be achieved.

While some of the conclusions are its own, *Coal Age* is indebted for most of the data in this article to D. Harrington and J. H. East Jr., of the U. S. Bureau of Mines, authors of a study of "Diesel Equipment in Underground Mining," I. C. 7406, now available from the Bureau.



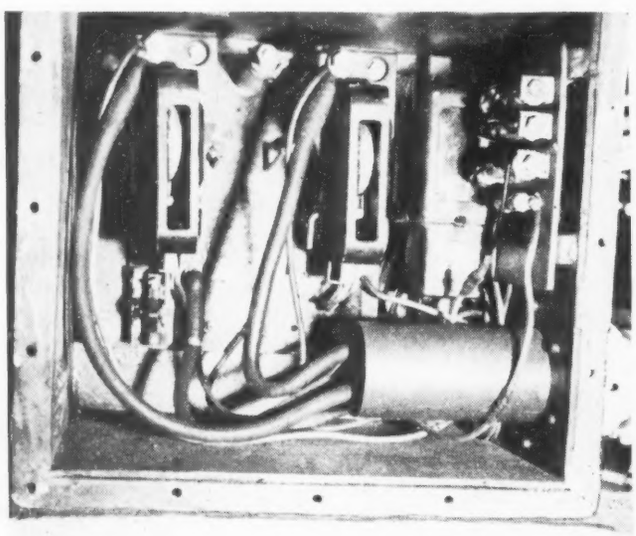
NIP CIRCUIT BREAKER with cover removed to show working parts.

Trailing-Cable and

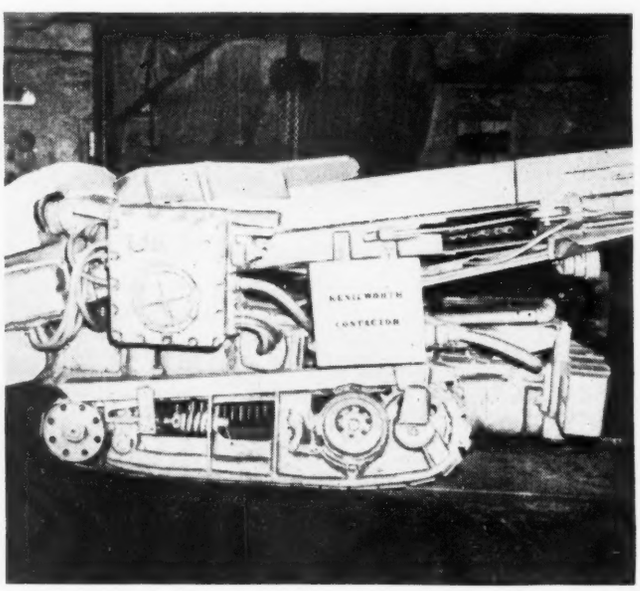
Ground Shield and Nip Circuit Breaker Protect Trailing Cable—Ground-fault Relay and Contactor Cut Power Off Machine in Case of Incipient Insulation Failure

By W. C. PAINTER
Independent Coal & Coke Co., Kenilworth, Utah

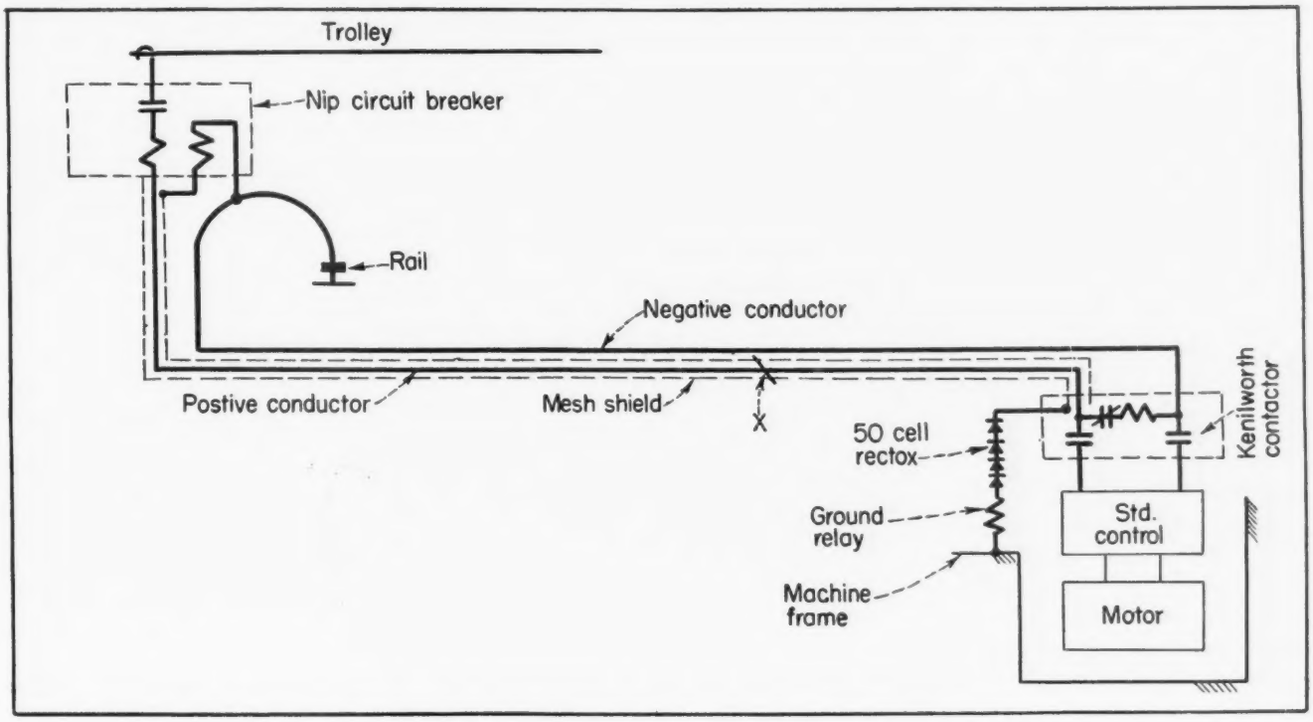
FOR SEVERAL YEARS it has been our belief at Kenilworth that the danger of a flash from trailing cables furnishing power to electrically operated face equipment is the greatest explosion hazard encountered in the majority of coal mines. Until recently little or nothing has been done to prevent the



KENILWORTH CONTACTOR and ground-fault relay with rectifier through which connection is made to cable ground shield.



CASE CONTAINING the Kenilworth contactor, ground-fault relay and rectifier mounted on loading machine.



KENILWORTH SYSTEM of trailing-cable and machine protection.

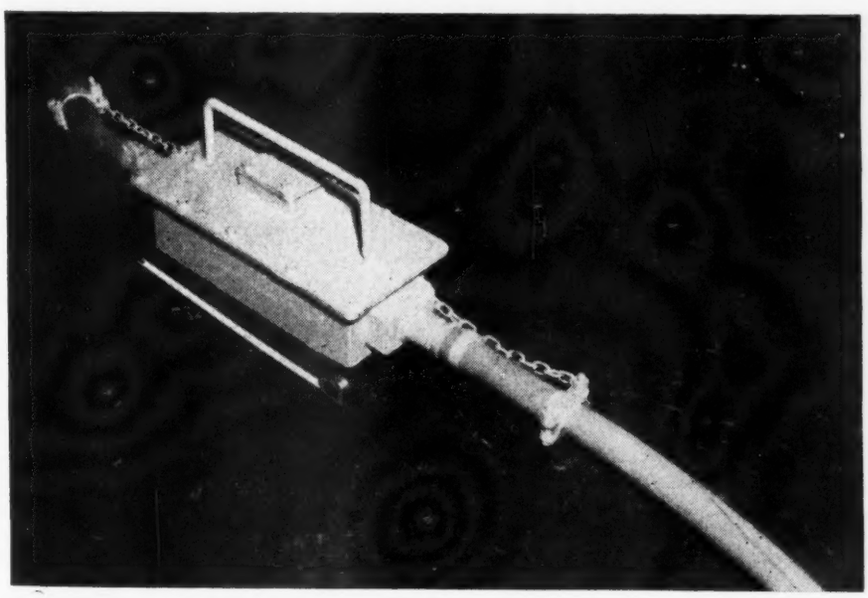
Machine Protection

occurrence of a vicious arc when a trailing cable is damaged. Fuses and circuit breakers protect the d.c. system against shorts and excessive currents but, because their operation depends on current above the normal peak-load requirements, they do nothing toward eliminating arcs in cables themselves.

In March, 1945, we had a very bad bounce in the 3rd East Entry off No. 2 Slope. In this particular case an 11BU loader operating in the area had its trailing cable pulled around the corner of the room neck in which it was working. The bounce forced the corner of the room neck out in such a manner that sufficient tension was placed on the trailing cable to mechanically pull it in two at the point where it was fastened to the loader frame. The circuit was protected by a high-speed breaker that opened instantly, but examination showed two small burns on the conduit of the loader and evidence of burns on a few of the great number of fine wires that make up the conductor of the cable.

Although the breaker operated with such great speed that neither the rubber nor several of the fine cotton threads exposed at the point where the cable was torn were burned, yet conditions were such that the great quantity of coal dust thrown into suspension by the bounce was ignited. Heavy rock dusting confined the ignition to the immediate area of the bounce, comprising approximately 200 ft. of entry. Twelve men were burned, seven of whom later died.

This diaster confirmed our opinion of trailing-cable hazards and



NIP CIRCUIT BREAKER attached to a length of trailing cable serving a mining machine. It cannot be reclosed after a cable fault.

Abstract of a paper presented at the 1947 meeting of the Mine Inspectors' Institute of America.

stimulated our efforts to develop a method of eliminating them. We formulated the objective of completely eliminating the occurrence of any visible spark or flame. This might, at first sight, appear unattainable, but we persevered until we succeeded in working out a scheme of using a ground shield around the insulated positive conductor and connecting it through the sensitive shunt-trip coil of a nip circuit breaker. The ground shield thus acts as a detector of an incipient fault in the cable insulation. The trip coil carries only the current through the insulation fault and not the total of fault current plus load current.

The accompanying diagram provides a good perspective of what the scheme actually entails. Note that the positive lead from the trolley nip connects directly to the nip circuit breaker. The connection from this breaker is a positive conductor insulated and shielded with a wire mesh. The nip circuit breaker shunt-trip coil is connected between the mesh shield and the negative conductor.

Let us suppose that a fault occurred at X, causing the mesh to contact the positive conductor. If the circuit is traced through, it will be seen that the trip coil is then placed directly across the 250-volt d.c. circuit. Since the circuit breaker will trip in 1/120 of a second when the operating coil is energized with only 4 amp. at a potential of 3 volts, the circuit is cleared before a short circuit can occur to cause an arc. After developing the apparatus, the cable was severely damaged during tests, but no visible arc was detected.

Cable Protection Original Aim

At that time we were thinking solely of eliminating the hazards arising out of the use of trailing cables without consideration of new protection for mining machines. We obtained a special De-Ion circuit breaker from Westinghouse and a 1,000-ft. length of special trailing cable with ground shields from U. S. Rubber. We then made a series of tests in the shop by purposely damaging lengths of the cable and observing the tripping of the circuit breaker. These tests proved the soundness of our ideas but showed that certain modifications should be made.

We then ordered from U. S. Rubber 2,000 ft. of trailing cable to a new specification: positive conductor with Buna-S insulation surrounded by a fine-wire ground shield; negative conductor covered with Neoprene with no ground shield; outside belt, Neoprene made with a newly discovered orange-colored filler in place of carbon black. The object of specifying that the negative be covered with the mechanically stronger and more flame- and heat-resistant Neoprene instead of Buna-S was to eliminate the possibility of electrical contact between ground shield and negative conductor except through the circuit-breaker trip coil.

We realized that operation of the safety device was contingent on the crew making complete connection at the nip of the negative conductor directly to rail and of the positive conductor to the trolley through the nip circuit breaker. To avoid having to rely on the human element, we added a DP contactor at the entrance to the controller of the mining machine with its magnet coil connected across the conductor of the trailing cable. This Kenilworth contactor remains open until both connections are made at the nip.

Breaker Non-Reclosable

An important feature of our trailing cable protection is that our nip circuit breaker is non-reclosable and is an integral part of a standard length of trailing cable which, at its other end, has one-half of a special connector. If the nip circuit breaker trips, it is because an incipient fault has developed in the cable. Therefore, the cable and circuit breaker unit must be removed and replaced by a spare. The damaged unit will be repaired as good as new in the shop. The nip circuit breaker also has an overload trip set at a value well above the operating peak just in case of an unpredictable short.

We next tackled the problem of safety grounding of mining machine frames with special reference to machines mounted on rubber tires. We did not allow ourselves to be prejudiced by conventional old-fashioned safety rules.

Fault Detection Essential

The sole objective of a frame-ground protective system must be to eliminate all hazards due to faulting of the insulation of circuits in the mining machines. This cannot be effected solely by grounding the frame. The method must include a device that will detect an incipient faulting of the insulation and then instantly cut power off the machine. As long as power is cut off it is immaterial whether or not the frame is grounded.

Accordingly we developed the method of connecting the machine frame to the negative conductor through a sensitive manually-reset ground-fault relay, the connection to negative being made through a Rectox rectifier to the ground shield in the cable. The normally closed contact of this relay is in series with the magnet coil of the Kenilworth contactor. When an incipient faulting of the insulation occurs, the ground-fault relay trips and opens the DP contactor, thus cutting off the power.

The ground-fault-relay coil carries only the current through an insulation fault and not the total of fault current plus load current. The trailing cable remains protected as before. The Rectox shown in series with the ground-relay coil is absolutely necessary in this circuit to eliminate the possibility of the Kenilworth contactor closing before the negative conductor is connected to the rail, and also to prevent ground-fault current in the cable being shunted away from the trip coil of the nip circuit breaker.

There is a certain lack of logic in conventional ideas of grounding the frames of machines. The old conventional ideas are somewhat as follows:

1. If all frames and inclosures of circuits remain at ground potential, no hazards can occur.
2. Therefore, all that is necessary to insure safety is to ground all frames.

Conditions Fix Logic

This logic is all right if confined to the condition where there is no faulting of the insulation, in which condition there is no hazard anyway. But if and when the insulation faults, it will start charging the frame and establish a short-circuit current through the so-called ground connection. In addition to the hazardous arcing at the fault, the resulting short-circuit current through the ground connection will result in the frame attaining a voltage much above ground potential, thus nullifying the alleged objective.

The answer is that safety depends on cutting off power the instant an incipient fault starts. This principle we are carrying out in all of our new safety measures for both a.c. and d.c. circuits.

Safety rules should insist on attainment of specified objectives without any restrictions on the means used.

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The Foremen's Forum

Cutting Cost of Materials and Supplies: How the Foreman Can Do His Part

THE OLD ADAGE that materials are money is increasingly true in coal mining. According to data compiled by OPA, the cost of materials and supplies in 1945 was 40.61c. per ton in the bituminous industry and 54.6c. in the anthracite industry, exclusive of purchased power and coal used at the mines. In the bituminous industry, the cost of materials and supplies was 13.9 percent of the total cost of coal production and selling; in anthracite, 8.9 percent.

In hand-loading bituminous mines, average cost of materials and supplies in 1945 was 34.66c. per ton, or 10.3 percent of the total cost to produce and sell coal; machine-loading mines, 43.24c. per ton and 15.3 percent of total cost; strip mines, 44.99c. per ton and 19.3 percent of total cost. By producing districts, costs for hand-loading mines ranged from 22.92 to 60.19c. per ton, machine-loading mines, 25.58 to 82.88c.; and strip mines, 26.39 to 67.47c. per ton.

There is little doubt but what costs of materials and supplies have risen considerably since 1945. There also is little doubt but what, in the majority of mines, better use and recovery of materials and supplies is possible. If more care in this direction could achieve a reduction of, say, 10 percent in cost, the results are distinctly worth while. In 1945, for example, if material and supply cost had been 10 percent less at hand-loading bituminous mines, the saving would have been 3.47c. per ton. In that year, according to OPA, the net margin of hand-loading mines was 7.63c.

A 10-percent cut in material and supply cost at machine-loading mines in 1945 would have totaled 4.32c. per ton, compared to that year's net margin of 16.48c. In the case of bituminous strip mines, the saving would have been 4.50c., against the net margin of 26.18c. In anthracite, the saving would have been 5.46c. per ton, against the industry's net margin of 3.8c. per ton. Where pennies count, as in coal mining, it can be seen, therefore, that savings in materials and supplies really count up.

Since practically all materials and supplies are used under his direct supervision, the foreman, whether he be responsible for production, preparation maintenance or any other phase of mining, is in the best position to promote economy in use and thus cut down cost. By so doing, he will be increasing the efficiency of his department and putting his company in a stronger position competitive-wise, with corresponding benefit to himself.

To keep coal production going, a long list of materials and supplies must be kept flowing into surface plants and equipment and underground workings. To name but a few, they include repair parts and materials, copper wire and cable, rail bonds, explosives, detonators, tamping materials, wire rope, oil and grease, gasoline and diesel fuel, tires, rail, ties, timber, lumber, steel plate and shapes, ballast, sand, gravel, cement, rock dust, pipe and fittings, welding materials, bolts, nuts, rivets, nails, spikes, paint, packing, friction tape and so on and so on.

Economy in the use of materials and supplies involves perhaps four things:

1. Using no more than is necessary to do the job correctly and efficiently.
2. Preventing waste and loss.
3. Getting all the life out of the material that it normally should provide.
4. Recovering everything possible for re-use.

Where to start and how to proceed in conserving materials and supplies are matters that could be discussed at some length. Some hints, however, are as follows:

Economy Hints

Knowledge of Quantities and Costs—With a clear idea of how much things cost and the quantity used, the problem of cutting material and supply expenditures is considerably eased. It is possible to achieve a reduction without such knowledge, but having the facts permits putting the pressure where pressure will get the most in results.

This does not mean that the foreman must also be a supply clerk, but he should keep track of the major items making up his material and supply cost. Some things, naturally, are more important than others. Thus, where a single item costs a lot of dollars, even though only a few

How Good Are You in Promoting Efficiency?

This quiz is designed to help you in your supervisory work. Study the questions, check "Yes" or "No" and then turn to p. 104 for explanation.

1. Have you read anything or attended any meeting lately to check up on new developments and get ideas you can use to raise efficiency? Yes ☐ No ☐
2. Do you figure your tons per man every day? Yes ☐ No ☐
3. Was your tons-per-man average above the mine average last month? Yes ☐ No ☐
4. Do you keep a record of time lost because of electrical and mechanical breakdowns? Yes ☐ No ☐
5. Was the time lost because of machine breakdowns in your section less than the mine average last month? Yes ☐ No ☐
6. Do you have to get extra supplies from the outside during the working shift as often as once a week? Yes ☐ No ☐
7. Do you always figure on spending more time with the loading equipment than anywhere else? Yes ☐ No ☐
8. Does your loading equipment have to wait on anything else very often? Yes ☐ No ☐
9. Have you spent several hours or as much as a day or more lately studying how your men do some job, such as drilling, with the idea of making it easier and more efficient? Yes ☐ No ☐
10. Have any of your men come to you lately with a suggestion for doing something a better way? Yes ☐ No ☐

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are used, it should have a greater share of attention; likewise, such items as props, at, for example, 40 to 60c. each, that cost less each but are used in large quantities.

Knowing quantities and costs, the foreman is in a better position to find the right answers to the following:

1. What material and supply items are sufficiently important that study to promote economy in use is likely to pay off in substantial fashion?
2. Where should a start be made in reducing loss and waste?
3. Where will increasing the life of the part or the material yield the biggest dividends?
4. How much is it possible to reduce cost by increasing recovery of materials for use again elsewhere (where such recovery is practicable, safe and economical)?

Education of Workers—The man who pays $10 or more for a fishing rod is likely to be careful not to break it or lose it because he knows what it cost him. His interest in the things management furnishes to make it possible to mine coal may not be as strong, but a lot can be accomplished by giving him the facts. This, of course, should be a fundamental part of the foreman's activities. A little judicious conversation on the costs of various supply and material items, with practical suggestions for their conservation, cannot help but create greater interest in their careful use, in preventing loss and waste, in doing the things that will lengthen their useful life and in making sure that everything that it is possible to recover will be recovered.

Matching Requisitions to Needs—Getting the right quantities of the right things to the right places at the right times is vitally important in keeping tonnage and efficiency up. Taking care of emergencies dictates keeping a reserve on hand. However, forethought in gaging future needs and ordering as necessary can prevent loss and waste. Excess ordering, on the other hand, ties up money needlessly. Next, keeping an excess of certain things in the working section, where storage conditions may not be of the best, results in added deterioration. Thirdly, excess material is more likely to be forgotten or covered up and left behind.

Handling Materials Properly—To prevent loss or damage and to make them easily accessible, proper provision should be made for receiving and storing materials and supplies until the time they are needed. Places where materials are to be received should be out of the way of traffic yet accessible to the men who have to do the delivering. Materials should not be delivered helter-skelter and, especially, should not be placed in spots where they are likely to be damaged or covered by loose coal, falls and the like. Boxes or small racks should be installed for small articles and for loose stuff like sand or clay. Special storage facilities should, of course, be provided for explosives and detonators. Racks or platforms should be provided for grease and oil cans and provisions should be made to prevent leakage and to prevent any leakage that might occur from becoming a hazard.

Much more might be said on the subject of provisions for receiving, storing and protecting materials and supplies until they are needed. Logical thinking, however, will provide the answers in all cases.

Machine Maintenance and Operation—Much material and many parts are wasted because of poor operation and maintenance of equipment. Running over machine cables is an example, because cables so treated are bound to have their life shortened over what normally could be expected. Failure to lubricate, or to lubricate parts of a machine properly, with consequent destruction of bearings, shafts, armatures and so on, also results in more supplies being used than otherwise would be required. Since many items required in repair work are expensive, promotion of good machine maintenance and operation provides a major opportunity for the foreman in cutting cost of materials and supplies. It of course involves getting to the men operating the equipment the facts on maintenance and operating failures and enlisting their interest and cooperation in their prevention.

Preventing Waste and Loss—Proper handling, storage and use of materials and supplies and good machine maintenance and operation are, as noted, major factors in preventing waste and loss. But carelessness and thoughtlessness also take their toll, when a man pitches a bar into the gob along the rib or covers up a pile of steel ties in cleaning loose coal off the track. Education is again the major answer. If men are aware of the value of the materials or parts they are working with and are trained to think about preventing loss or waste, they are less likely to bury a tie, cut a rail in two needlessly, ruin timbers by carelessness in measuring and so on.

Setting up stations to which men, when the opportunity presents, can deliver material they find lying around has been found helpful by some supervisors. Others make it a practice to look along the ribs and in other spots where material is likely to be ditched and thus make sure it is recovered before too late.

Salvage Operations—It is, of course, the custom to recover and re-use materials as places and territories are worked out. The question the foreman must answer is: "Do I get everything that can be gotten safely and economically?" The answer usually is pretty easy with some types of materials—and, in many mines, all or nearly all. But to make sure, the foreman should know fairly closely, as far as major materials are concerned, what went into his section and what percentage he normally should be getting out.

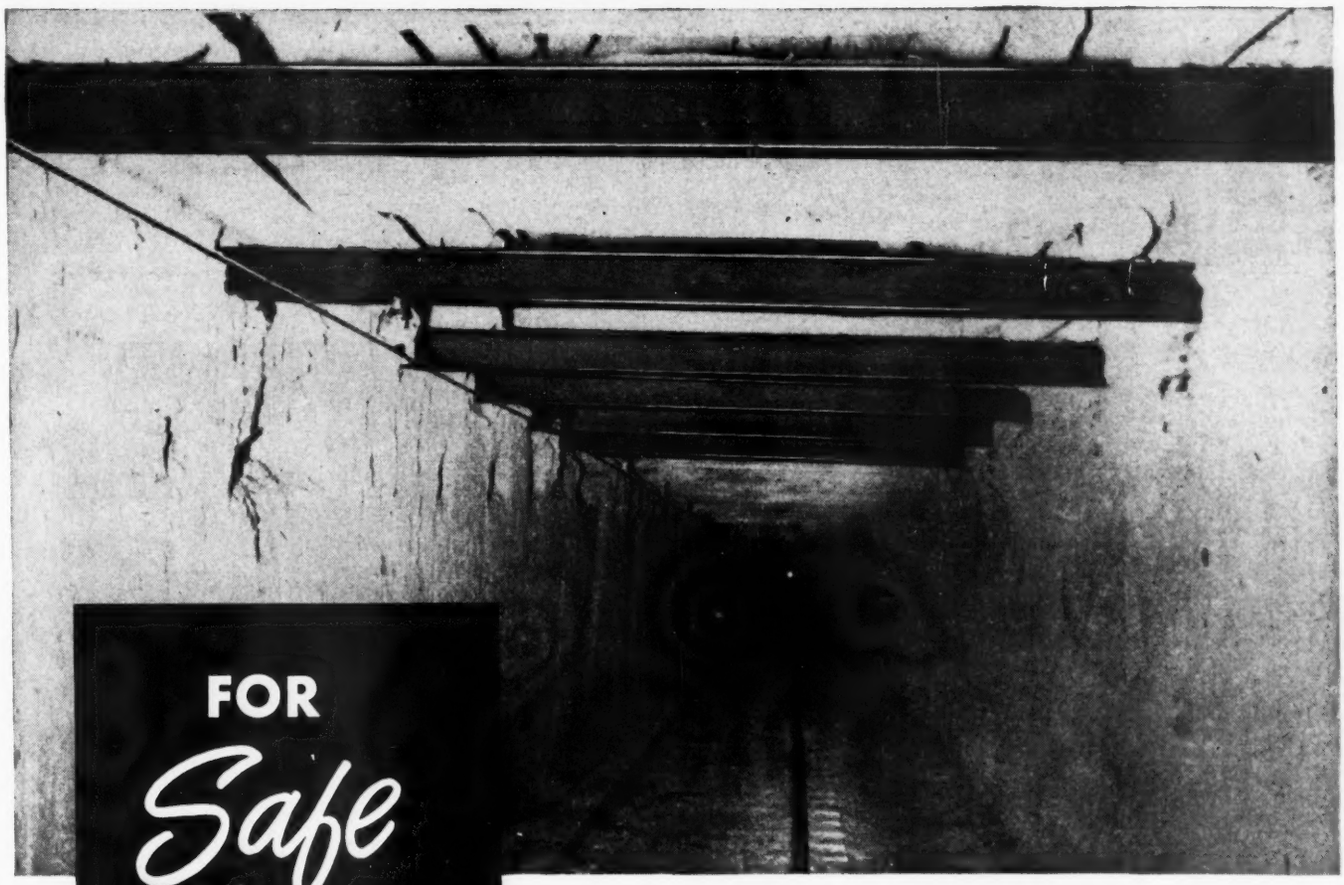
In salvage, also, the foreman will be helping himself and cutting mining cost by looking into the possibilities of new equipment or changes in methods that will increase the percentage of materials salvaged. A timber-pulling machine, for example, may increase recovery materially and promote safety in the process.

•

Promoting Efficiency

"Yes" should be the answer to Questions 1, 2, 3, 4, 5, 9 and 10, p. 102; "No" to Questions 6, 7 and 8. The reasons, based on principles generally accepted as leading to higher efficiency, are:

1. A lot of what we use we learn from the other fellow. The supervisor who gets ahead keeps track of new developments by reading, attending meetings and talking things over with others.
2. Knowledge of how you are doing, whether better or worse than before, is essential in keeping going in the right direction. Since tons per man is the critical factor in mining, every man in charge of production units should keep a record of how he stands in that vital respect.
3. In judging how well you are doing, the best thing is to compare. If you are below the average, it's time to get going.
4. Machines that are down can't produce and, since wages usually go on, the cost goes up. Keeping track of down time and why is the key to holding interruptions to a minimum.
5. Maintenance is an important item in total production and tons per man. If machine down time is more than the mine average, it's time to check up on the reasons, such as bad power, poor maintenance or abuse in operation.
6. When, for example, you can't load a place because you haven't got timber to put in it, production suffers and cost goes up. The answers are the right materials at the right place at the right time.
7. To get results, it is necessary to know where to concentrate your efforts. The loading machine generally can get the tonnage if it has the coal, so the answer usually is spend more time some place else.
8. Breaking bootlenecks is one of the supervisor's biggest jobs. The best sign that a bottleneck exists is loading equipment standing idle.
9. A constant search for better methods is one sign of a good supervisor. A better method is best worked out by studying the one you have to see where it can be improved.
10. An interested and cooperative crew goes a long way toward making a supervisor stand out. When the suggestions keep coming along, it's a sign they are working with you.



FOR *Safe* SUPPORT

USE DIRECT HITCHING AND STEEL MINE TIMBERS

HITCHING steel timbers directly into ribs, or setting supports on steel sections hitched in, will give you increased safety from roof falls.

Here are some of the reports that have come in from companies using this "legless" timbering—

"Permanent protection—at reduced installation cost. Better than wall or pier timbering methods."

"Lost-time accidents, lost production and attendant labor and material costs caused by derailments have been minimized along with the elimination of the hazards of falling timber, lagging and roof from knocked-out posts or legs."

"Frequent retimbering because of decay of legs and costly accidents resulting from improperly set posts are eliminated."

There is no mystery behind the reasons for steel's superiority in timbering. New steel structural sections are balanced sections with definite uniform sectional properties. They can be purchased to guaranteed minimum physical properties with uniformity throughout.

Lighter in weight than second hand rails of equivalent strength, new steel sections minimize labor and strain in handling . . . are fabricated with greater ease and with less possibility of setting up future sources of danger . . . are more economical.

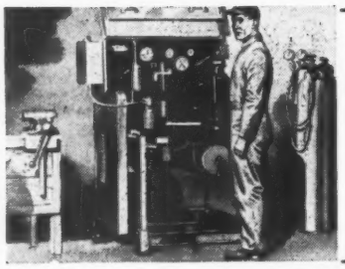
We will be glad to furnish all the information you need—without obligation on your part.

CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago

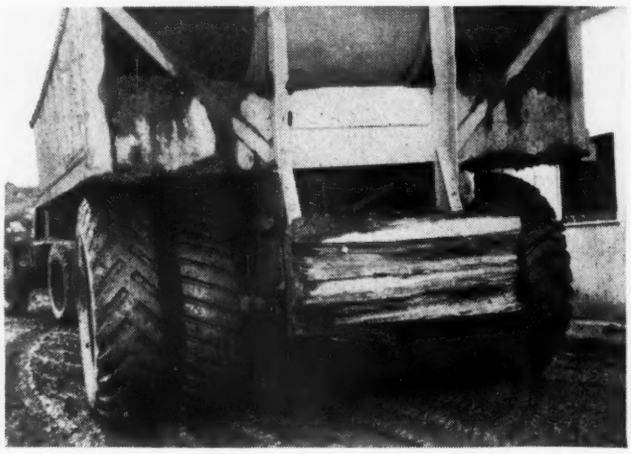
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York
7-1054

USS STEEL — UNITED STATES STEEL

UNITED STATES STEEL



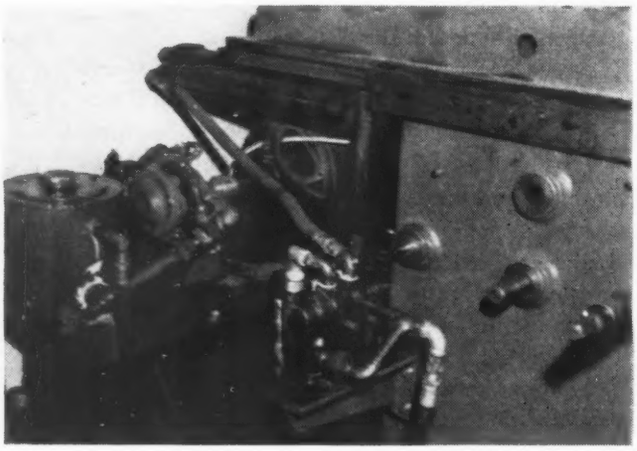
Operating Ideas



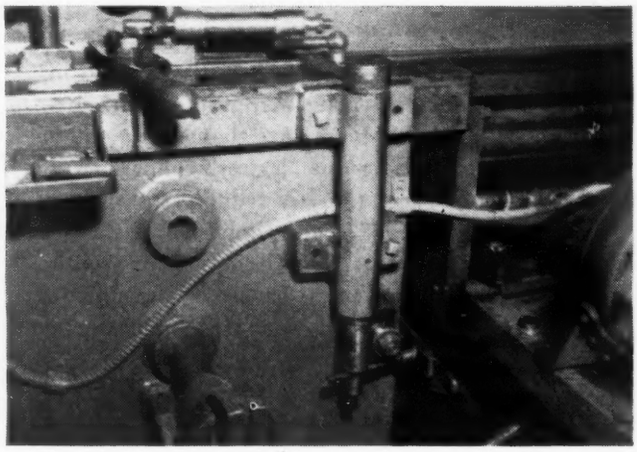
Removal of Truck-Trailer Springs Eliminates Maintenance

REMOVAL OF SPRINGS from the rear axle of a 30-ton trailer has eliminated maintenance and replacement costs without reducing serviceability at the Bee Veer mine, Binkley Mining Co. of Missouri, Macon, Mo. The springs were taken out by mechanics in the mine's shop. The illustrations show front (at the left) and rear views of the rear axle with the springs removed.

Hydraulic Power Modernizes Broken Shaper



THE HYDRAULIC POWER CYLINDER of the shaper, which was taken from a dump truck, can be seen above the pump motor. Storage for hydraulic oil is the round tank at the left. The stroke control valve is in the center foreground.

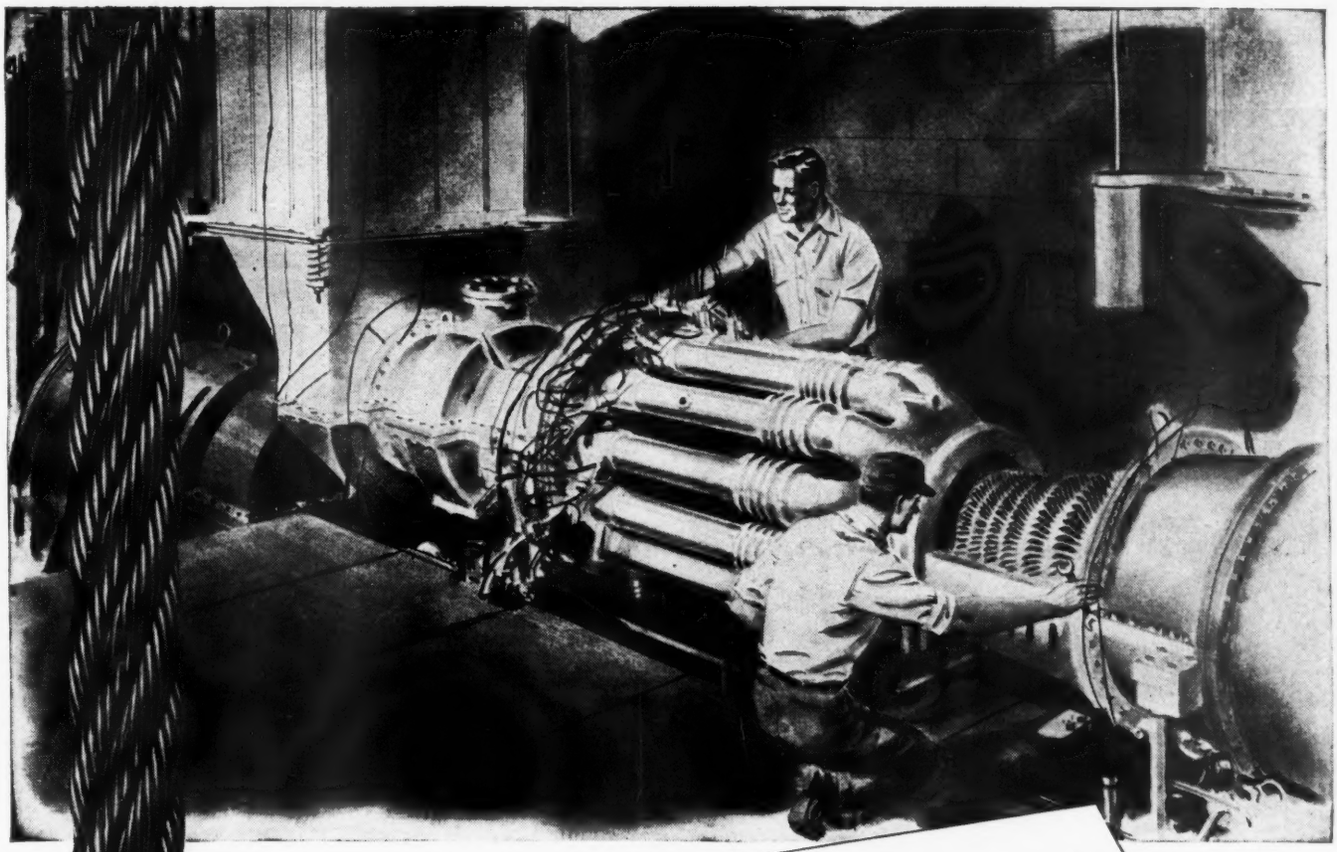


THE NEW HORIZONTAL cross link at the top contains double-acting coil springs. From the bottom of the vertical control shaft, motion is transmitted by a horizontal rod going through the frame of the shaper to the hydraulic control valve on the other side.

WHEN A CAST GEAR of a shaper broke in the shop of the Rail & River Coal Co., Bellaire, Ohio, the machine was rebuilt without gears and is now a far better shaper than before. A hydraulic cylinder was applied to operate the ram and the controls were changed so that the stroke can be adjusted to any length within the capacity of the machine.

The power cylinder was taken from a dump truck, the hydraulic pump is a Vickers vein type and the reversing valve is one used on a Joy loading machine to swing the rear conveyor.

To make the adjustable stops of the ram act through the linkage to operate the hydraulic reverse valve lever with the required snap, it was necessary to replace the former solid-rod top link with a link containing double-acting coil springs. Compression in that link causes the notcher at the bottom of the vertical shaft to carry clear across the raised block on the horizontal leaf spring.



Precisionbilt LIKE A GAS TURBINE PRIME MOVER*

J&L WIRE ROPE

PERMASET PREFORMED

Like a Gas Turbine Prime Mover*, J&L Precisionbilt Wire Rope is made of the finest materials by skilled men who have had years of practical experience. It too is an efficient mover, for J&L Precisionbilt Wire Rope handles material with economy and safety. To gain the advantage of low maintenance costs specify J&L Wire Rope on your order.

**Gas turbine prime mover, new and highly efficient, develops tremendous power with economy of space and fuel. Originally designed for locomotives, it is finding other uses as need for new sources of power arise.*

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

GILMORE WIRE ROPE DIVISION

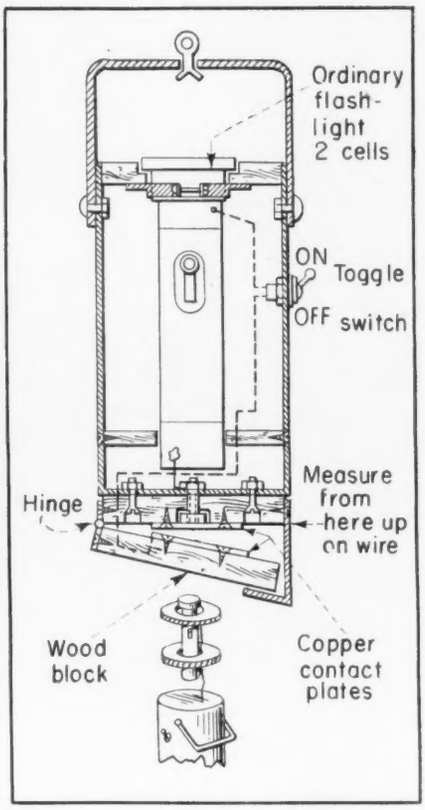
PITTSBURGH 30, PENNSYLVANIA

J&L *Precisionbilt* PERMASET PRE-FORMED WIRE ROPE

Light Eliminates Water-Level Gaging Errors

FRANK W. SMITH displays the new gaging device which he designed to measure water levels in abandoned shafts.

THE BUOYANCY of the water causes the float to pivot upward and thus closing the contacts and flashing the light.



CUTAWAY-SECTION showing the construction of the gaging device.

A LIGHT-FLASHING gaging device helps the Engineering Corps of the Loree colliery, The Hudson Coal Co., Plymouth, Pa., to measure the water levels in abandoned shafts more accurately. Formerly, a wood float or block fastened on a tape or wire was used to measure the water in the shafts, leaving much to guesswork, which resulted in inaccurate or doubtful measurements.

Determining the position of a standing or fluctuating water level is important when the active workings are adjacent to an abandoned territory. Then, the proper precautions must be taken for the protection of life and property.

The flashlight float, shown in the accompanying illustrations, eliminates the guesswork in recording the level of the water in old shafts. This device, designed by Frank W. Smith, noteman on the engineering corps, consists of a common two-cell battery flashlight mounted in a 3-in. diameter container. Two wooden blocks, with metal contacts, are hinged at the bottom of the container. The contacts are wired in series with a toggle switch to the flashlight's circuit. Flipping the toggle switch to the off-position makes the float inoperative.

In using the flashlight float, the device is lowered on a graduated ⅛-in. diameter flexible steel sash cord from a hand reel. The instant the lower block of wood touches the water the contacts close and the light burns. Then, the distance to the water is recorded and the elevation calculated.

Thermostat Controls Tractor Radiator Louvers

AUTOMATIC OPENING and shutting of radiator louvers assures more even operating temperatures for diesel-equipped Dart tractors at the Mark Twain mine, Huntsville-Sinclair Mining Co., Huntsville, Mo. The equipment, shown in the accompanying photograph, is a Kysor Automatic Shutter Series AU887, manufactured by the Kysor Heater Co., Cadillac, Mich.

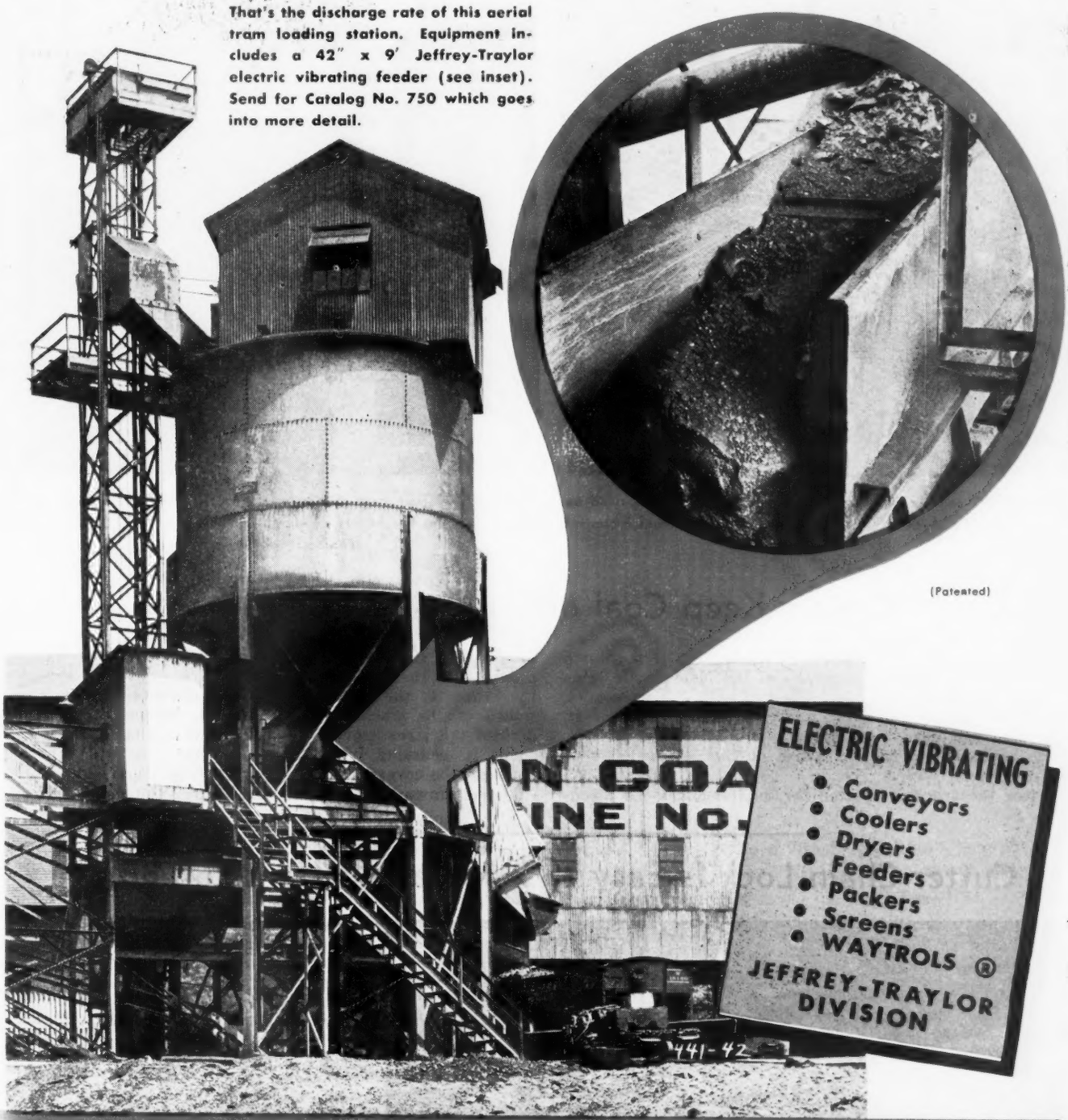
When the radiator water temperature rises above 160 deg. F., the louvers are opened by an air cylinder controlled by a radiator thermostat. In the same way, louvers are closed when the temperature falls below 160 deg. F. The air pump that activates the cylinder operates at 90 lb. pressure.

An increase in radiator temperature above 160 deg. F. will open these louver shutters automatically. The air cylinder that operates the shutters is just above the upper right-hand corner of the louver.

THERMOSTATICALLY CONTROLLED radiator louvers improve diesel-engine performance by maintaining a more uniform temperature in the cooling system.

FEEDING ROCK AND SLATE 800 T.P.H.

That's the discharge rate of this aerial tram loading station. Equipment includes a 42" x 9' Jeffrey-Traylor electric vibrating feeder (see inset). Send for Catalog No. 750 which goes into more detail.



(Patented)

THE JEFFREY MANUFACTURING COMPANY

912-99 North Fourth St., Columbus 16, Ohio

ESTABLISHED 1877

Complete Line of Material Handling, Processing and Mining Equipment

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ATTENDANT raises cover from one track after truck has passed on. Cover will fall and rest at attendant's right until next truck is spotted for dumping.

A TRUCK dumps over the lowered covers designed to keep the runways clean. The covers divide the coal falling toward the track, sending it into the pit.

Covers Keep Coal off Dump-Pit Runways

TRIANGULAR SHEET-IRON covers keep raw coal from dump trucks off the dump-pit runways at the New Castle mine of the Windsor Coal Co., Windsor, Mo. The covers, shown in the accompanying photographs, are about 4 ft. long and are braced inside with five triangular panels. Each cover is hinged lengthwise at the outside edge of the runways.

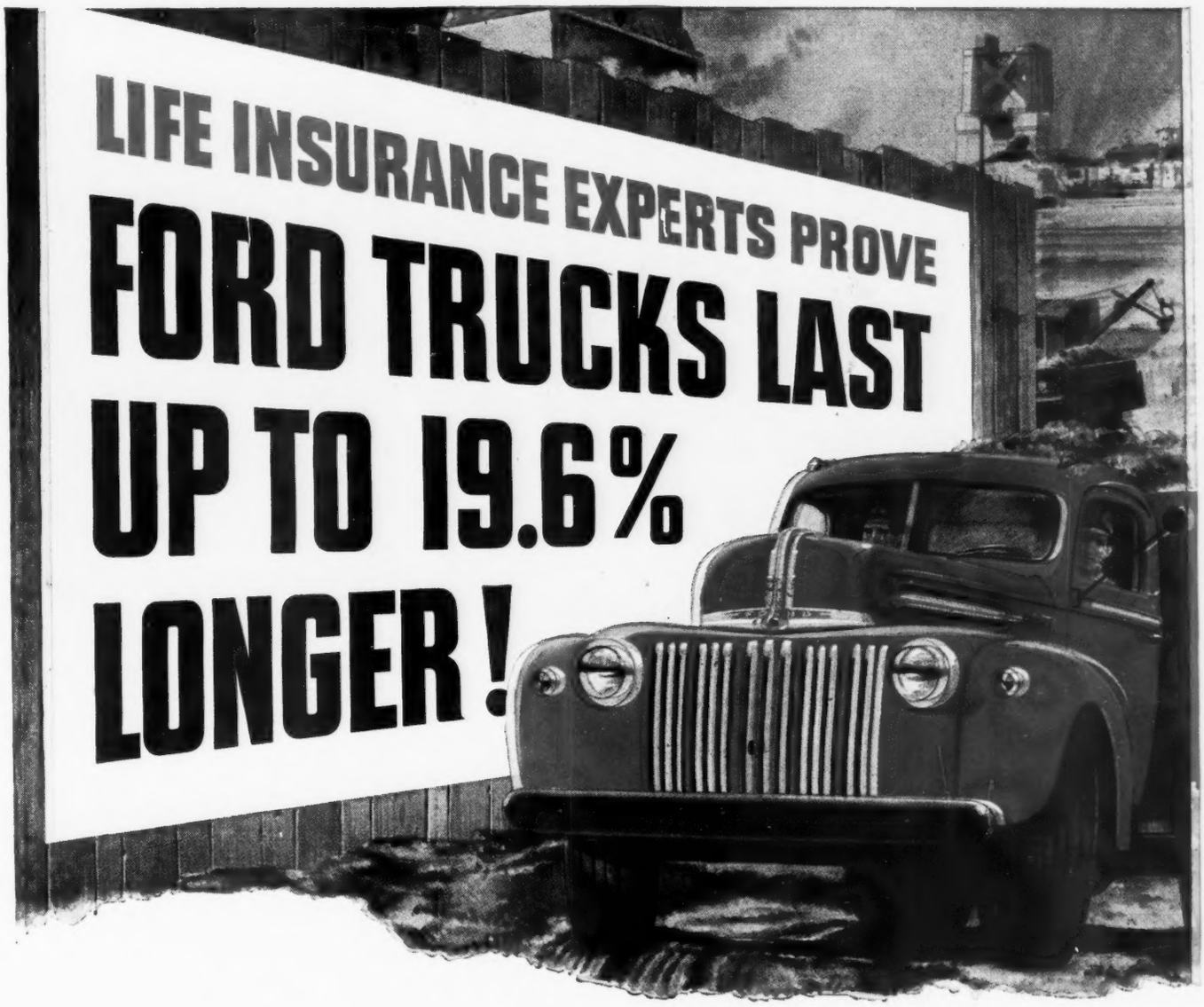
After the truck is spotted for dumping, the pit attendant lowers the two covers by means of a wire-rope handle, so that the apex of each triangle-like cover is above the center of the track and a flange lies over the inside guard of the track. When the truck dumps, the cover divides the stream of coal falling toward the track and sends it coursing into the pit. After the truck has emptied, the covers are lifted off the tracks and laid outside the runway, clearing the tracks for the next truck.

Cutter-Chain Lock Is Easy to Handle and Hard to Loose

CUTTER-CHAIN LOCK is shown in the approximate position for use on a machine undergoing overhaul.

YEARS AGO, some mine officials discovered that one way of making sure a cutter-chain locking device stayed with a shortwall cutting machine was to combine it with the sheave that is a "must" in machine operation. This device is now widely used. Some officials adopted it after hearing of it or seeing published photographs, while others independently arrived at the combination design.

The illustration shows a recent design made and used at No. 11 mine of the Delmont Fuel Co., Summersville, W. Va. The handle welded on at the point of balance adds to the convenience of handling and is a finger saver. Leonard Leedy, chief electrician, has made up one of these combined sheave and locking bar for each shortwall.



NO LONGER need you guess about which make of truck to buy! Now you can know, beforehand, *which* one of all five sales leaders has delivered the longest service, which has the longest life-expectancy! Ford!

And the proof is *certified* proof! Certified by the same scientific methods used by life insurance companies in computing their rates!

4,967,000 Trucks Studied. Wolfe, Corcoran and Linder, noted New York Life Insurance Actuaries, assembled the records of all trucks of the five sales leaders registered from 1933 through 1941—a total of *4,967,000* trucks! Then they prepared *truck* life-expectancy tables in the same identical manner in which they prepare *human* life-expectancy tables for life insurance companies.

Ford Wins! Up to 19.6% longer life for Ford Trucks! Up to 19.6% longer life than the four other sales leaders! That's what the certified truck life-expectancy tables prove! The reason? Ford knows how to build trucks to last longer. Ford Trucks are built stronger! See your Ford Dealer today. He'll show you why it's good business to wait for the truck with the longest life-expectancy—Ford!

Certified proof

FORD TRUCKS LAST LONGER

The life-expectancy of a Ford Truck is:

13.1% longer than that of Truck "B"
3.2% longer than that of Truck "C"
7.6% longer than that of Truck "D"
19.6% longer than that of Truck "E"

OFFICIAL ACTUARIAL CERTIFICATE

Based on the application of sound and accepted actuarial methods to the actual experience as measured by truck registrations, we hereby certify that, in our opinion, the accompanying table fairly presents the relative life-expectancy of the trucks involved.

WOLFE, CORCORAN AND LINDER
Life Insurance Actuaries, New York, N.Y.

Tire-Changing Rig Features Speed and Ease

STEEL CYLINDER, of ½-in. steel and about 12 in. deep, with Y welded inside, is the base for tire-changing rig.

TIRE IS ROLLED into position and will lie flat on cylinder with lip of tire on cylinder rim.

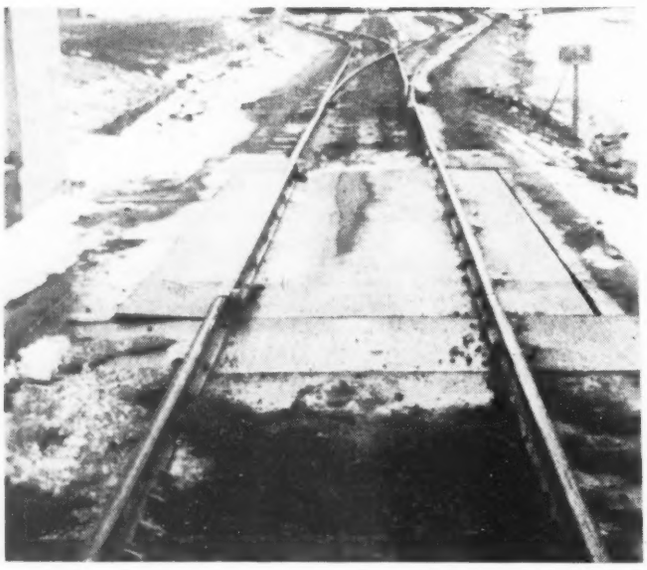
COMPLETE ASSEMBLY. Pressure from 12-ton jack forces rim and disc down inside steel cylinder.

FAST CHANGES FOR HEAVY truck tires are provided by an assembly invented by Ralph Sanders, mechanic, Pittsburg & Midway Coal Mining Co., West Mineral, Kan. Component parts of the assembly, shown in the accompanying illustrations, are: a hollow ½-in. steel cylinder about 12 in. deep, the diameter of which is slightly larger than the inner diameter of the tire; two steel Y's of identical size, tapering from the center outward, one of which is welded inside one end of the cylinder; three steel rods about 32 in. long, with a U at one end and an eye at the other; and a 12-ton hydraulic jack.

To change a tire, the steel cylinder is laid flat, with the welded Y next to the floor. The tire is then placed on top of the cylinder with the disc uppermost, so that the lip of the tire fits snugly on the upper rim of the cylinder. The U-ends of the three rods are dropped through the holes of the disc so that they straddle the arms of the Y inside the cylinder; then they are locked in position by pins. The jack then is placed in the center of the hub disc, the second Y is placed on top of the jack and the arms of the second Y are placed inside the eyes of the rods.

When the jack is raised, the tire is held in place on top of the cylinder but the rim and disc are forced downward into the steel cylinder, freeing the tire. Using this device, one man can easily change a truck tire.

Car Scales Weigh One Truck at a Time



ONE-AT-A-TIME WEIGHING of railroad-car trucks is provided by scales cut to one-third the length of ordinary scales. Lower maintenance and good accuracy characterize the performance record.

RAILROAD-CAR SCALES cut down to one-third the standard length, as shown in the accompanying illustration, weigh each truck separately as a loaded car passes over them at the Tiger mine, Hume-Sinclair Coal Mining Co., Hume, Mo. The weight carried by each truck is recorded automatically on a tape at the weighman's desk in the mine office, which is adjacent to the tracks and overlooks them. The shorter scales require less maintenance than the standard size, yet give excellent accuracy.

Keep It Rolling!

Fixing a case of trouble is like removing another sprag from a standing trip—it's easier to get things rolling again. To fix a thing and make it stay fixed can be the source of a good operating idea. That's why we suggest that you submit your mechanical, electrical, operating or safety ideas. If accepted, Coal Age, upon publication, will pay you $5 or more for each.

you save 3 ways when you buy

GEOPRENE

PORTABLE CABLE

COSTS LESS TO BUY

You save up to 20 per cent when you buy a Geoprene Portable cable. You get a smaller-size cable that costs you less but delivers the same power as a larger one.

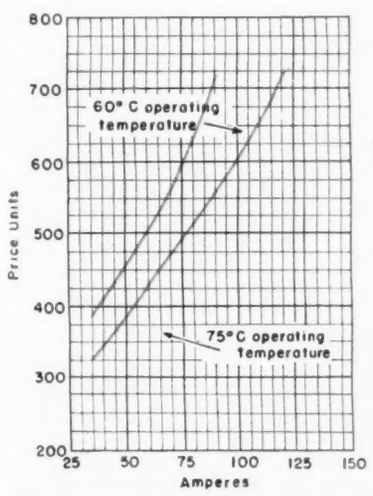
The key to this saving is higher current-carrying capacity resulting from better insulation and jacket.

The graph, based on 600-volt 2-conductor flat twin cable, shows how 75-C insulation instead of the usual 60-C reduces the cable size needed for any given job and permits a first-cost saving of up to 19 per cent.

COSTS LESS TO HANDLE

You can carry more on a reel because it weighs less, takes less space. For example, a take-up reel on a mine locomotive holding 300 ft of 60-C cable can take up to 425 ft of 75-C cable.

This saving in weight and bulk is particularly true of the larger sizes. For example, a shovel previously requiring a bulky 4/0-awg conductor size can now be served by a 2/0-awg cable.



High-temperature insulation and jacket raise current-carrying capacity, permit use of lower-price, smaller-size cable.

COSTS LESS TO MAINTAIN

Your maintenance costs are lower because Geoprene* hits a new high in strength and chemical stability. In standard tests its tear strength is two and one-half times as high as Tellurium, our famous prewar natural rubber jacket.

This remarkable resistance to cutting action and abrasion boosts the life and safety of Geoprene Portable well beyond that of an ordinary portable cable. In addition, Geoprene shows 105 per cent better aging properties than required by industry specs, and is approved by the state of Pennsylvania for flame resistance.

May we suggest that you remember this longer life at a lower price the next time you need portable cable. For details, call your G-E representative or write for Bulletin GEA-4229. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

*Geoprene—special G-E compound containing approximately 60 per cent neoprene, with the balance consisting of plasticizers, accelerators, and reinforcing agents.

GENERAL ELECTRIC

5012-78

READ WHY A TRUCK LIKE THIS

CAN SAVE YOU MONEY!

This truck—like every Dodge "*Job-Rated*" truck—is built to fit a specific hauling job.

It's powered with exactly the right one of 7 engines—plus the right gear ratio—to provide the pulling power the job requires, with maximum economy.

It's built with exactly the right clutch, transmission, rear axle—the right units throughout . . . for "top" performance, longer life, and maximum economy . . . on the job for which it was built.

It stands to reason that a truck "*Job-Rated*" to haul *your* loads over *your* roads —will save YOU money!

You can get a truck to fit *your* job—a truck to give better performance, better service to your customers, and to save you money!

Simply explain your hauling problems in detail to your Dodge dealer. He has the engineering data from which to recommend the best truck investment you can make.

★ ★ ★

Your Dodge dealer is interested in your continued satisfaction: *First*, by selling you a truck that fits your job; *Second*, by giving you dependable Dodge truck service; *Third*, by providing you with truck parts that are identical with original Dodge "*Job-Rated*" truck parts.

ONLY DODGE BUILDS "*Job-Rated*" TRUCKS

DODGE

Fit the Job . . . Last Longer !

FASTER, CLEANER DRILLING *with less* "FLIGHT DRAG"

COALMASTER SPIR-L-WELD AUGER

The smoothness of the flight surface *reduces resistance* in conveying borings from the drill head—and minimizes clogging. This smoothness, combined with the concavity of the Coalmaster flight surface, forces cuttings away from the flight-edge and reduces drag to a minimum. The result is *faster, cleaner drilling* with *decreased power demand* and *less strain.*

Only Coalmaster Augers offer the smoothness of conveying surface achieved by the exclusive Coalmaster Spir-L-Weld process.

DRILLING COALMASTER TOOLS

Order from your nearest Coalmaster distributor

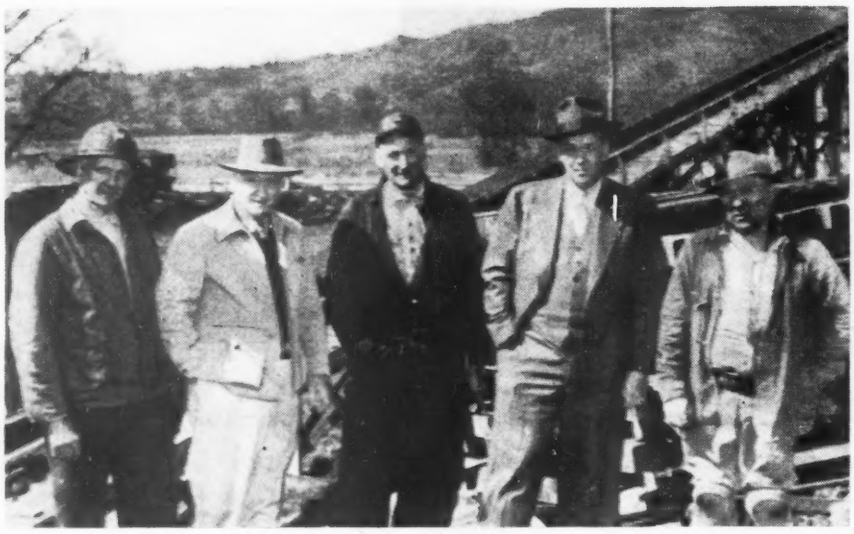
- Austin Powder Company, Cleveland, Ohio
- Balimo, Ltd., London, Eng.
- British-American Industries, Ltd., New York City, New York
- The Buda Company, Harvey, Illinois
- Diamond Supply Company, Inc., Evansville, Indiana
- Dooley Brothers, Peoria, Illinois
- Illinois Powder Mfg. Co., St. Louis, Missouri; Denver, Colorado; Salt Lake City, Utah
- Joy Manufacturing Company, Main Office: Pittsburgh, Pa. Subsidiaries and representatives in 57 countries.
- Salem Tool Company, Salem, Ohio

Coalmaster Special Alloy Steel Bits, are heat treated for high strength wear and abrasion resistance. They are scientifically shaped and machined for faster, better cutting. Especially designed for exactness in drilling all bore hole sizes for underground and strip operations.

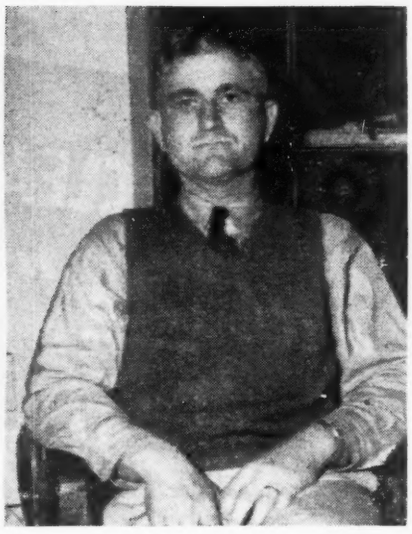
Coalmaster Hexanspeed Assembly, above right, is a fool-proof, automatic coupling that speeds up auger changing—and increases productive time at the bore hole.

CENTRAL MINE EQUIPMENT COMPANY

ST. LOUIS 15, MO.



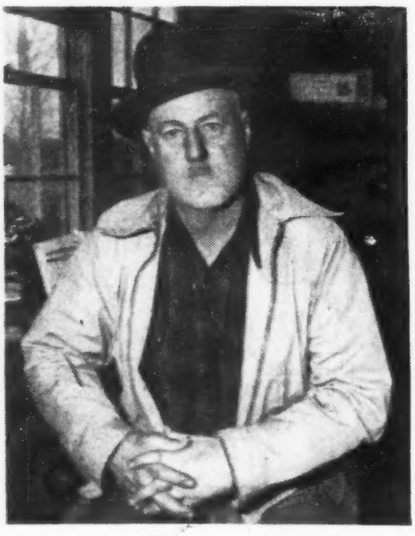
W. W. Tyler (left), outside foreman, Cadwalader Jones, manager, L. W. Leedy, chief electrician, R. H. Jamison, president, and Okey Johnson, general mine foreman, Delmont Fuel Co., Summersville, W. W. Va.



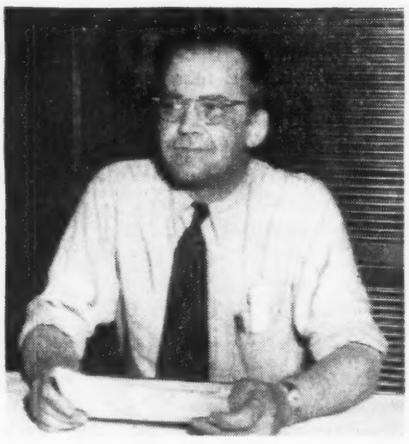
O. A. Runkle, acting general superintendent, Mines Nos. 15 & 18, Pittsburg & Midway Coal Mining Co., Pittsburg, Kan.

COAL MEN

R. J. Emigh (left), chief engineer, and Steve Mondock, engineer, The Morrisdale Coal Mining Co., Morrisdale, Pa.



J. R. Burnett, superintendent, Reliance mine, Crowe Coal Co., Clinton, Mo.



George Drum, ass't supt., Hazleton (Pa.) Shaft colliery, The Lehigh Valley Coal Co.

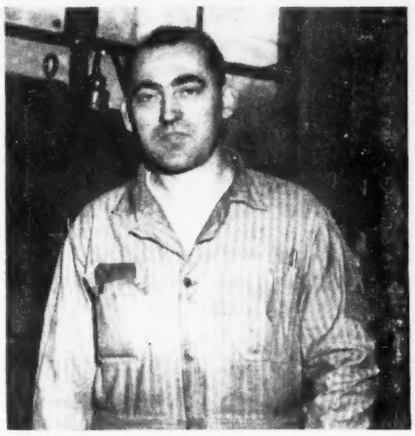
John O. Gill (left), master mechanic, and Joe Haines, shop foreman, Barnes & Tucker Co., Bakerton, Pa.

Laurence E. Tierney Jr. (left), president, Eastern Coal Corp., Bluefield, W. Va., and Henry F. Warden, vice president, The American Coal Co. of Allegany County, McComas, W. Va.

J. E. Williams, personnel and safety director, Rail & River Coal Co., in his office at Bellaire, Ohio.

Frank Hanasky (left), safety inspector, Charles Winters, efficiency foreman, and H. H. Kirby, superintendent, No. 3 mine, Rail & River Coal Co., Bellaire, Ohio; John S. Shroeder, Shroeder Bros., Pittsburgh, and W. H. McNeal, Coal Age.

ON THE JOB



Michael Duda, master mechanic, No. 3 mine, Rail & River Coal Co., Bellaire, Ohio.

Paul Phelps, farm manager, Pittsburg & Midway Coal Mining Co., Pittsburg, Kan.

R. A. Cantalope (left), fireboss, and H. C. Caldwell, superintendent, Lancashire No. 15 mine, Barnes & Tucker Co.

John Crichton (left), superintendent, Beaverdale (Pa.) mines, A. B. Crichton Jr., assistant to the president, and W. H. Seelinger, superintendent, Crichton No. 4 mine, Johnstown Coal & Coke Co.

L. G. Jordan (left), field engineer, and Andy F. Whitt, chief engineer, Rail & River Coal Co., Bellaire, Ohio.

Can I fill my Hose Requirements with pre-war quality goods?

Your Thermoid Distributor* Will Know!

He will tell you *No.* Today's products carrying the Thermoid trade mark are even better than pre-war quality. War born experiences plus latest technical advances provide the added quality. This new quality is in production . . . it is no longer necessary to take whatever you can get.

He can also tell you—

That Thermoid hose is made in a wide range of types and sizes. And, every type measures up to the service conditions for which it is sold.

He knows something about Thermoid too—

Thermoid concentrates its manufacturing for industry on the well integrated line shown below. The Company itself, is large enough for precise, low cost, high quality production, but small enough to be quickly responsive to customers' specific problems. That's one of the reasons why—

It's Good Business To Do Business With Thermoid!

*A postcard or a letter to the home office will bring his name and address to you.

Manufacturers of new equipment are invited to correspond direct with the home office.

Thermoid
PRODUCTS FOR INDUSTRY
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News Round-Up

New Bituminous Contract Signed July 8; Anthracite Revisions Adopted July 10

Representatives of the northern and captive bituminous mines signed the new "National Bituminous Coal Wage Agreement of 1947" in Washington, D. C., July 8. The agreement became national in fact within the next week when all but about 5,000,000 of the remaining tonnage also accepted it.

On June 10, revision of the anthracite agreement also was announced, raising wages $1.20 a day for inside and outside men, increasing operator payments into the welfare fund from 5 to 10c per ton and continuing the $100 vacation payment into 1948.

The new bituminous agreement (see p. 144) reduced the total length of the working day from nine to eight hours, including a 30-minute staggered lunch period instead of the previous 15-minute one. The basic day rate was raised from $11.85 to $13.05. Tonnage and other piece rates were not increased, but men working on such rates also were raised $1.20 per day ($3.05 over the payments provided in the contract expiring March 31, 1946).

Overtime for inside employees and employees at powerhouses, substations and pump operating 24 hours a day starts after eight hours a day and 40 hours a week, for outside employees, except continuous-operation men, after 7¼ hours per day and 36¼ hours per week. Strip-mine and coke-oven employees were transferred from the continuous-service to the regular outside-employee classification. Work done on the sixth day is optional but if worked is time-and-one-half. Holidays, when worked, also are time-and-one-half. Holidays are computed in arriving at the sixth and seventh days in the week. When employees paid by the day or ton start work, it counts as a day in computing the sixth and seventh days, provided they work when work is available.

"The new basing hourly rate," says the United Mine Workers' *Journal*, "is $1.63⅛. The agreement represents a financial gain of $3.54 per day on a weighted-average basis of both inside and outside rates, which includes 41c for the additional 15-minute lunch time and 30c for the welfare and retirement fund, the latter estimated on 6 tons per-man per-day production."

After the initial breakdown on May 31, negotiations for a new contract were resumed June 15 when Benjamin F. Fairless, president, United States Steel Corp., and George M. Humphrey, president, Pittsburgh Consolidation Coal Co., went into session with union officials. "Later on," according to the United Mine Workers' *Journal*, "similar meetings were held which Charles O'Neill and Harry Moses attended. The negotiations then reverted to the representatives of the U.M.W.A. and O'Neill and Moses, the ensuing conferences constituting one of the most gruelling episodes in the history of collective bargaining in bituminous-coal history. The operators fought every inch of the way to keep their offer down below the considerations that Lewis insisted were the minimum the rank-and-file of the membership, by resolute action on the 1946 convention, expected and which by all the yardstick measurements were just and equitable. The U.M.W.A. never presented a formal set of demands. The contract was negotiated on the basis of suggestions as to what would be necessary grants."

In addition to the wage and hour provisions, major items in the new bituminous agreement include the following:

A statement that the contract is to "cover the employment of persons employed in the bituminous coal mines covered by this agreement during such time as such persons are able and willing to work."

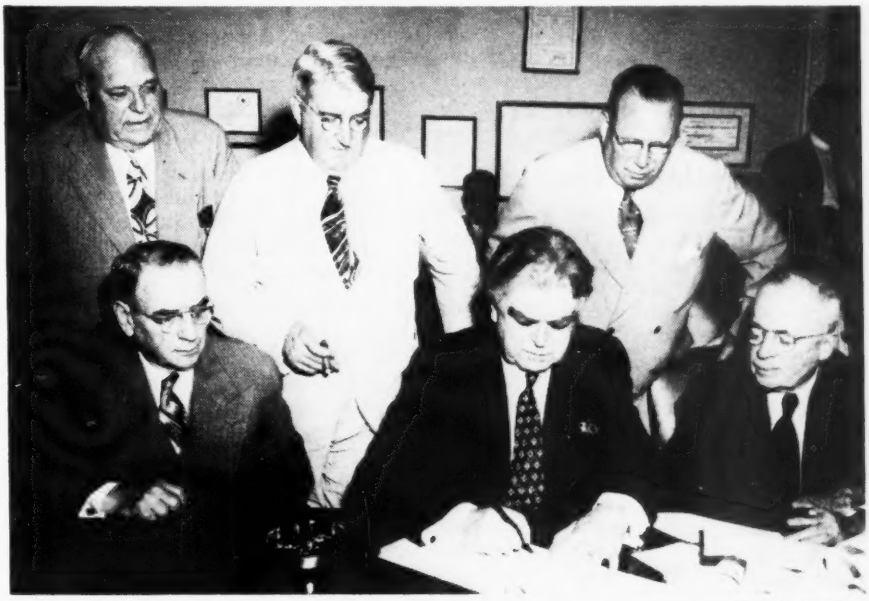
Exemption of coal inspectors, weigh bosses, watchmen, clerks, engineering and technical men and supervisors, the union agreeing not to organize or ask recognition of excepted supervisors during the life of the agreement. Disputes are to be referred to a joint board of review. Union members are C. F. Davis and John McAlpine. Operator members had not yet been appointed.

Inclusion of the mine safety code in the contract and establishment of a joint board of review composed of C. F. Davis and Paul K. Reed for the union and Messrs. Moses and O'Neill for the operators.

Establishment of mine-safety committees with limited powers.

A requirement that operators provide benefits under workmen's compensation and occupational-disease laws.

Establishment of a "United Mine Workers of American Welfare and Retirement Fund," with Lewis as chairman, Ezra Van Horn for the



Harris-Ewing

John L. Lewis, flanked by John O'Leary, vice president (left), and Thomas Kennedy, secretary-treasurer, U.M.W., signs the new bituminous wage contract with northern and midwestern operators, as operator representatives look on. Standing, left to right, are Ezra Van Horn, chairman of the joint wage conference, Charles O'Neill, representing the Northern Appalachian group, and Harry M. Moses, representing the captive mines.

Business Activity

		1947 to This Date	1947 Over 1946 to Date
Anthracite prod., June, 1947, net tons	4,597,000	27,787,000	— 5.6%
Est. bituminous prod., wk. of July 12, 1947	6,235,000	319,152,000	+ 25.2%
Domestic sales, stokers, April, 1947	3,936	13,564	— 76.7%
Domestic sales, oil burners, April, 1947	88,399	318,465	+210.6%

	Week of July 12, 1947	Month Ago	Year Ago
Business Week Index of Business Activity	190.8	191.8	177.7
Steel ingot operations (% of capacity)	91.5	95.8	87.9
Electric power output (million Kw.-Hr.)	4,531	4,702	4,156
Crude oil prod. (daily avg., 1,000 Bbl)	5,045	5,113	4,934
Misc. & L.C.L. carloadings (daily avg., 1,000 cars)	82	84	82
All other carloadings (daily avg., 1,000 cars)	52	66	63
Prices, spot commodity index (Moody's, Dec. 31, 1931 = 100)	413.5	401.9	333.2
Prices, industrial raw materials (B.L.S., Aug., 1939 = 100)	263.1	262.3	206.6
Prices, domestic farm products (B.L.S., Aug., 1939 = 100)	369.5	356.6	307.6
Prices, finished steel composite (*Steel*, ton)	$69.82	$69.82	$64.45
90 stocks, price index (Standard & Poor's Corp.)	126.0	118.7	144.4

operators and Thomas E. Murray as the neutral trustee.

Continuance of the $100 annual vacation payment.

Agreement by the operators to assist in obtaining written authorization to check off "membership dues, including initiation fees and assessments."

Elimination of all "no-strike," "indemnity," "guarantee," "penalty" and "protective" wage clauses.

Establishment of arrangements for settlement of local and district disputes by a system of conferences culminating in an impartial umpire.

Establishment of a price for the sale of house coal to employees at the cost of production exclusive of sales and administrative costs.

Freezing of house rents at present levels, with the union taking the position that it would permit adjustments to compensate for improvements.

Nominal termination date fixed as June 30, 1948, with a provision that either party can terminate the agreement upon 30 days' notice.

In reports on "suggestions" withdrawn by the union, only two specific ones have been cited—pay for six additional holidays a year and overtime Saturdays and Sundays regardless of how many days previously had been worked.

New Developments

• Further details of the three new mines planned by the Peabody Coal Co., Chicago (Coal Age, July, p. 126), have recently been reported. The largest of the new operations will be a shaft mine near Tovey, Ill., to be known as Peabody No. 10 mine, with a capacity of 1,500 t.p.h. Work on the shaft is expected to begin shortly. The new mine to be opened on the Penwell mine property near Pana, recently purchased by Peabody, will be known as Peabody No. 17 mine and will have a planned capacity of 3,500 tons per shift. The third, a slope operation, will be opened west of Harco at Premium No. 43 and is expected to produce 4,000 tons daily. Coal produced at this mine will be cleaned at No. 47 mine.

• Plans for a new byproduct-coal mine at the southern tip of Boone County, West Virginia, to be known as Wharton No. 2, has been announced by L. C. Campbell, vice president in charge of the coal division, Eastern Gas & Fuel Associates. After more than a year of exploration, a large acreage of land has been leased and will be mined in the Hernshaw seam, which outcrops about 150 ft. above the floor of the valley.

The new operation is expected to go into production around October, 1948, according to H. John Harper, assistant to the vice president, who is in charge of development. Initial production is expected to be 2,000 tons daily, with 300 miners employed, later increasing to 4,000 tons daily as it is developed.

The mine will be completely mechanized, employing belt conveyors to transport coal from the face to the main-line haulageway underground. Large steel mine cars will haul the coal to a 700-ft. conveyor, which will take it down the mountain to the tipple. The tipple will be equipped for mechanical cleaning and will load on the Chesapeake & Ohio.

A complete town is to be built for miners well away from the operation. Seventy homes will first be built and contracts for grading of the sites for the tipple, mine buildings and these homes have already been let.

• Sale of the Binkley Mining Co. of Missouri, with the Bee-Veer mine at Macon, Mo., to the Sinclair Coal Co., Kansas City, Mo., was reported early last month.

• Purchase of approximately 30,000 acres of coal land in Putnam, Mason and Jackson Counties, West Virginia, was announced July 3 by the Carbide & Chemicals Corp. According to T. R. Ragland, superintendent of the firm's South Charleston plant, the land was bought solely as reserve for possible future use and no immediate plans for its development have been made.

• W. E. Sellards, Lewisburg, W. Va., president, Left Fork Fuel Co., Inc., recently announced his resignation as general manager of the Margarette Coal Corp., Marfrance, W. Va., to devote his time to the opening of a completely mechanized mine on a 2,000-acre tract of Sewell coal land in Greenbrier County that has been under lease to Left Fork since 1944. A stripping operation producing 600 tons daily has been carried on at the property, which is said to contain reserves sufficient for a production of 200,000 tons annually for 35 years, and it's understood that there is coal for two more years of stripping. The new mine is expected to be producing 600 tons daily by mid-October and the coal will be shipped via the Cheaspeake & Ohio to Newport News, Va. The Booth Coal Co., Kenova, will be exclusive distributor for the new mine.

• Engineers for the Utah Fuel Co., Salt Lake City, are reportedly investigating desposits of coking coal recently discovered by the U. S. Bureau of Mines in the Coal Creek district near Paonia, Colo. The company will prove leases on government lands in the area this summer, it was said. According to Wesley Hyatt, chief engineer, if tests warrant it, a new mine would be opened at a cost of several million dollars.

• Plans for opening of two mines this fall at Rich Creek were recently announced by the Snap Creek Coal Co., Logan, W. Va. Production from the Eagle and Island Creek seams is expected to be about 2,000 tons daily, according to E. J. Payne, vice president and general manager of the firm.

• Purchase of the Hawthorne Coal Corp.'s mine near Norton, W. Va., by H. C. Bolling and T. M. Godwin recently was disclosed. The new owners had previously purchased 650 acres of coal land adjoining the property from the Oulds estate. The latest sale involves about 50 coke ovens, a tipple, 50 dwellings and six buildings. The same personnel, headed by T. M. Porter superintendent, will be retained, with the addition of F. H. Siedel as secretary-treasurer. A strip-mining lease for five years let to Bruton & Barksdale also has been reported and the new owners are understood to be planning to continue to produce coke under the same trade name. Underground working of the three seams is under consideration for the future.

• A new strip mine in Saline County, near Harrisburg, Ill., is reportedly to be opened by the Bankston Creek Collieries Co., a subsidiary of the Sahara Coal Co.

• Cedar Grove Collieries, Inc., Cedar Grove, W. Va., recently has been acquired by the Dexter-Carpenter Coal Co., Inc., New York. William F. Hahman, who recently joined the Dexter-Carpenter organization, has been named vice president in charge of operations. William H. Carpenter, president of Dexter-Carpenter, has been named president of Cedar Grove,

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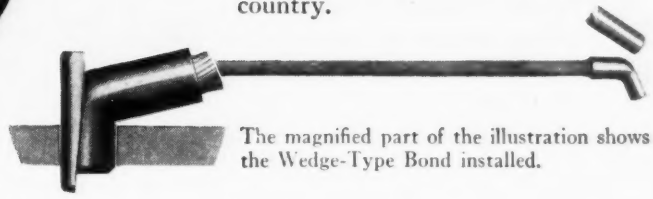

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and Roger W. Tompkins, formerly president and general manager, continues as general manager.

• The Ideal mine of the Waco Collieries, Inc., Hopedale, Ohio, has reportedly been acquired by the Castle Shannon Coal Corp., Pittsburgh, Pa. Capacity of the operation will be increased to 1,000 tons daily.

• The Birch Creek Coal Co.'s new multiple-track tipple west of Brazil, Ind., on the Pennsylvania R. R., has recently been placed in active operation. The tipple has a capacity of 1,500 tons daily. The company also is opening up new workings adjoining the tipple to increase its present output.

•

Dates Set for NCA Convention

Preliminary plans for the National Coal Association convention, to be held at the LaSalle Hotel, June 16-18, recently were announced.

While the detailed program will be forthcoming at a later date, the tentative list of subjects to be discussed include: the Coal Heating Service program, mine safety, promotion of mining education and training, land use by strip mines, taxation, public relations, advertising, research and economics. One major function of the meeting will be the determination of future policies and plans for their execution.

The convention committee recently named by Fred S. McConnell, president, NCA, includes Henry C. Woods, chairman of the board, Sahara Coal Co., Chicago, as chairman; S. Austin Caperton, president, Slab Fork Coal Co., Slab Fork, W. Va.; E. H. Davis, president, N. Y. Coal Co., Columbus, Ohio; F. A. Fontyn, vice president, Ebensburg Coal Co., Philadelphia; Charles R. Griffith, president, Southern Coal & Coke Co., Knoxville, Tenn.; and B. P. Manley, executive secretary, Utah Coal Operators' Association, Salt Lake City.

•

Strip Control Bill Made Law in Ohio

The long-contested legislation calling for the restoration of Ohio land mined by stripping methods and the posting of bonds to insure compliance became law June 28 as Gov. Herbert signed the measure approved on the legislature's final day. The final version represented a compromise between the Senate and House measures and was considerably less restrictive than proposals considered during the session.

The new law requires the licensing of all operators who mine more than 250 tons of coal a year by stripping and the posting of a bond of $100 an acre to guarantee compliance with the restoration provisions. In restoring the land, operators are required to knock off the top of spoil banks to a cross-section width of 15 ft., cover the face of exposed coal and seal breakthroughs to underground workings. The measure calls for planting of trees, grasses and shrubs, up to a maximum of $50 an acre, after termination of operations, unless the director of the state agricultural experiment station decides that the land is of no value and need not be restored.

•

Illinois Explosion Kills 27 Miners

Twenty-seven men were killed and three critically injured July 24 when an explosion ripped a section of Mine No. 8, Old Ben Coal Corp., West Frankfort, Ill. At the time of the blast, which occurred at the 480-ft. level 1½ miles from the shaft, approximately 225 men were underground.

While the full cause was yet to be determined, the Illinois State Mining Board July 26th issued a preliminary report stating that the explosion "was caused by ignition of an accumulation of methane gas." The report also said that the blast "in any and all respects, was not due to the negligence on the part of anyone." Rescue work was hampered by carbon monoxide and heavy rock falls. Workers said the explosion pushed mine cars and machinery about and hurled timbers and men up to 40 ft. away.

•

Ohio Safety Meet Planned for August

Plans were being made last month for the annual Ohio miners' safety and accident-prevention meet to be held Aug. 17 in the stadium of the Dillonvale, Ohio, high school. The event is sponsored by the Ohio Division of Safety and Hygiene, in cooperation with the U.M.W., the Ohio Coal Association and the state and federal mine bureaus, and draws a large attendance from the area. C. G. Evans is general chairman.

A feature of the meet will be the competition of 18 miners' first aid teams. Speakers of national prominence will be invited to address the gathering and music will be furnished by high school bands from Mt. Pleasant and Dillonvale.

•

Anthracite Operators Pick Representatives

Following a meeting of anthracite operators held in Wilkes-Barre July 14, it was announced that Major W. W. Inglis had resigned as a member of the Committee of Twelve, effective immediately, and as a member of the Anthracite Board of Conciliation, as of Oct. 1, 1947. The group elected Edward Griffith, president, Glen Alden Coal Co., a member of the Committee of Twelve to succeed Major Inglis, and R. L. Birtley, president, Hammond Coal Co., a member of the Committee to succeed James H. Pierce. Mr. Griffith also was elected to the Board of Conciliation by the operators of District 1.

Mr. Birtley was re-elected operator trustee for the Anthracite Health and Welfare Fund, to serve for one year from Aug. 1, 1947. An anthracite wage agreement committee also was elected by the group, as follows: Mr. Birtley, L. R. Close, H. J. Connolly, Cadwallader Evans Jr., C. A. Garner, Mr. Griffith, Louis Pagnotti, James Prendergast, R. E. Taggart and J. B. Warriner. The committee elected Mr. Taggart chairman.

As a tribute to Major Inglis' long service to the industry, those attending the meeting unanimously adopted the following resolution: "Resolved that an appropriate resolution in recognition of Major Inglis' long service as Chairman of the Anthracite Wage Negotiating Committee and as a member of the Board of Conciliation be framed by a committee selected for that purpose and that the resolution be engraved upon a silver plaque for presentation to Major Inglis."

•

King Coal Cavalcade Set for October

Plans for the 1947 Old King Coal Cavalcade, to be held at West Frankfort, Ill., Oct. 2-4, have been announced. The three-day event, which draws a large crowd of mining men and the public from the Southern Illinois area, is held annually and was resumed last year after a lapse because of the war.

The Cavalcade will include exhibits by manufacturers and distributors of mining machinery and equipment, as well as a full program of parades and festivities celebrating the traditional return to earth of Old King Coal.

•

Consol. Miners Receive Awards at Picnic

Presentation of the Joseph A. Holmes Certificate of Honor to Mines 206-207, Consolidation Coal Co. (Ky.), marked a picnic held June 22 near Jenkins and attended by more than 400 employees of the company and others. Presentation of the award, in recognition of the mines' outstanding record in producing 1,971,000 tons without a fatality, was made by A. U. Miller, supervising engineer, U. S. Bureau of Mines. The Miners were congratulated on their achievement by Walter Hornsby, Kentucky mine inspector, and A. D. Sisk, safety director, Big Sandy-Elkhorn Operators' Association.

The Holmes Certificate of Honor also was presented to S. J. Chewning, outside foreman, honored for his record of 11½ years without a lost-time accident in his crew.

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His suggestion gave our production a real lift. The Oliver "Cletrac" dealer sure knows his business and is a big help in ours.

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LONDON—Amid looming fuel shortages for winter and controversies over the effects of the five-day week in coal mines, Emanuel Shinwell, Minister of Fuel and Power, reassured British miners that the new work week would stick but warned at the same time that absenteeism must stop if the shorter work week is to be justified. At the same time, Will Lawther, president, National Union of Mine Workers, urged miners to honor the responsibilities and obligations of their agreement.

Those Britons taking a pessimistic view of the future point out that more than 500,000 tons of coal were lost in the first half of the year because of unofficial strikes and that a sharp drop in the recruitment rate from 1,000 to 321 in June would make it impossible to reach the Goal of 730,000 miners by November. A more serious coal shortage than last winter's was freely predicted in some some quarters, with estimates of the gap between needs and production running as high as 13,000,000 tons.

However, with drastic economies imposed on public-utility and domestic consumption of coal, stock piles were reported to have reached 9,500,000 tons. Hopes were expressed that summer restrictions, calling for a 20-percent cut in power and gas consumption from May to October, would build stocks up to the 15,000,000-ton goal by October.

BRUSSELS—Out of a ten-year capital investment plan amounting to $4,980,000,000 proposed by the Belgian Minister of Economic Coordination, about $356,000,000 would go to modernization and renewal of capital equipment in the coal mining industry, according to an announcement of tentative plans. The estimated allocation is based on maintenance of annual output at 30,000,000 tons.

TURKEY—Half a billion tons of exportable 1,890-B.t.u. coal blocked out in Anatolia province has been cited by economic experts as a possible means of relieving Europe's acute fuel shortage and hastening economic recovery. However, without United States equipment and ingenuity, Turkey's output is likely to remain at less than a ton per man-day and she will be unable to make sizeable shipments to Europe without impeding her own industrial growth.

GERMANY—Coal and transportation shortages have forced a 30-percent curtailment in German industries in the United States zone, according to Gen. Lucius D. Clay, United States Commander in Europe. Gen. Clay cited a drop in output from 233,000 tons per day in March to 216,000 in May in the Ruhr mines. This, together with failure of railway repairs to keep pace with needs, has forced cuts up to 30 percent in allocation of coal to industry to create stockpiles of coal against minimum heating needs for the coming winter.

Meanwhile, United States Secretary of State George C. Marshall July 16 emphasized the role of coal in the rehabilitation of Europe and declared that means to boost output in the Ruhr would be one of the major considerations for the approaching joint conference with Britain to be held in Washington. Earlier, Robert L. Garner, vice president of the new World Bank, stated that the bank would give financial and technical support to the revival of Ruhr coal production as soon as an administrative formula has been agreed upon.

In the Soviet zone, seven-day-a-week operation of coal mines in eastern Germany was decreed to boost coal production and closer supervision of distribution was ordered to stretch supplies. Miners will continue to work an eight-hour day six days a week and the new production schedule will be carried out by recruiting new miners.

VIENNA—Austrian industry, recently heartened by successful negotiation of a free $13,500,000 from the post-UNRRA relief bill for Austrian purchases of coal in Europe, principally in Poland, has run into a flash coal crisis due to breakdown of deliveries from the Ruhr. Two explanations are being given for the breakdown: that traffic is stalled somewhere in Bavaria and that Austria owes Germany more coal cars than she has returned. Result of the sudden shortage is a threat to what has been thus far Austria's main industrial advance—resumption of work at the coking batteries in Linz and opening of new blast furnaces in Linz and Donawitz. Meanwhile, Austrians expressed fears that Soviet hostility to the Marshall plan might impede deliveries of coal from Poland.

MEETINGS

- National Safety Congress and Exposition: Oct. 6-10, Stevens and Sherman Hotels, Chicago.
- New River Coal Operators' Association: annual meeting, Oct. 9, Mt. Hope, W. Va.
- National Coal Association: convention, Oct. 16-18, LaSalle Hotel, Chicago.
- Fuels Conference of Coal Division, A.I.M.E., and Fuels Division, A.S.M.E.: Oct. 20-22, Hotel Gibson, Cincinnati.
- Illinois Mining Institute: annual meeting, Oct. 31, Hotel Abraham Lincoln, Springfield, Ohio.

Pittsburgh Coal Co. Announces Scholarships

Three successful candidates for its scholarships in electrical and mining engineering have been announced by the Pittsburgh Coal Co., Library, Pa., as follows: Marlin Funka, son of Mr. and Mrs. Raymond Funka, Houston, Pa., a 1947 graduate of Chartiers high school; Robert Kuchinic, son of Mr. and Mrs. Louis Kuchinic, Finleyville, Pa., who graduated from the Peters Township high school with top honors in the class of 1947; and Nick Lukoch, son of Mr. and Mrs. James Lukoch, Jacobs Creek, Pa., who has completed his sophomore year at Pennsylvania State College.

Chellson, Ginder in Coal Age Staff Shifts

Harry C. Chellson, market research manager for *Coal Age* and *Engineering & Mining Journal*, has been named district manager for the two publications at Pittsburgh, Pa., succeeding Willis S. Drake. Wm. H. H. Ginder Jr., who this spring joined the publications, has succeeded Mr. Chellson as market research manager.

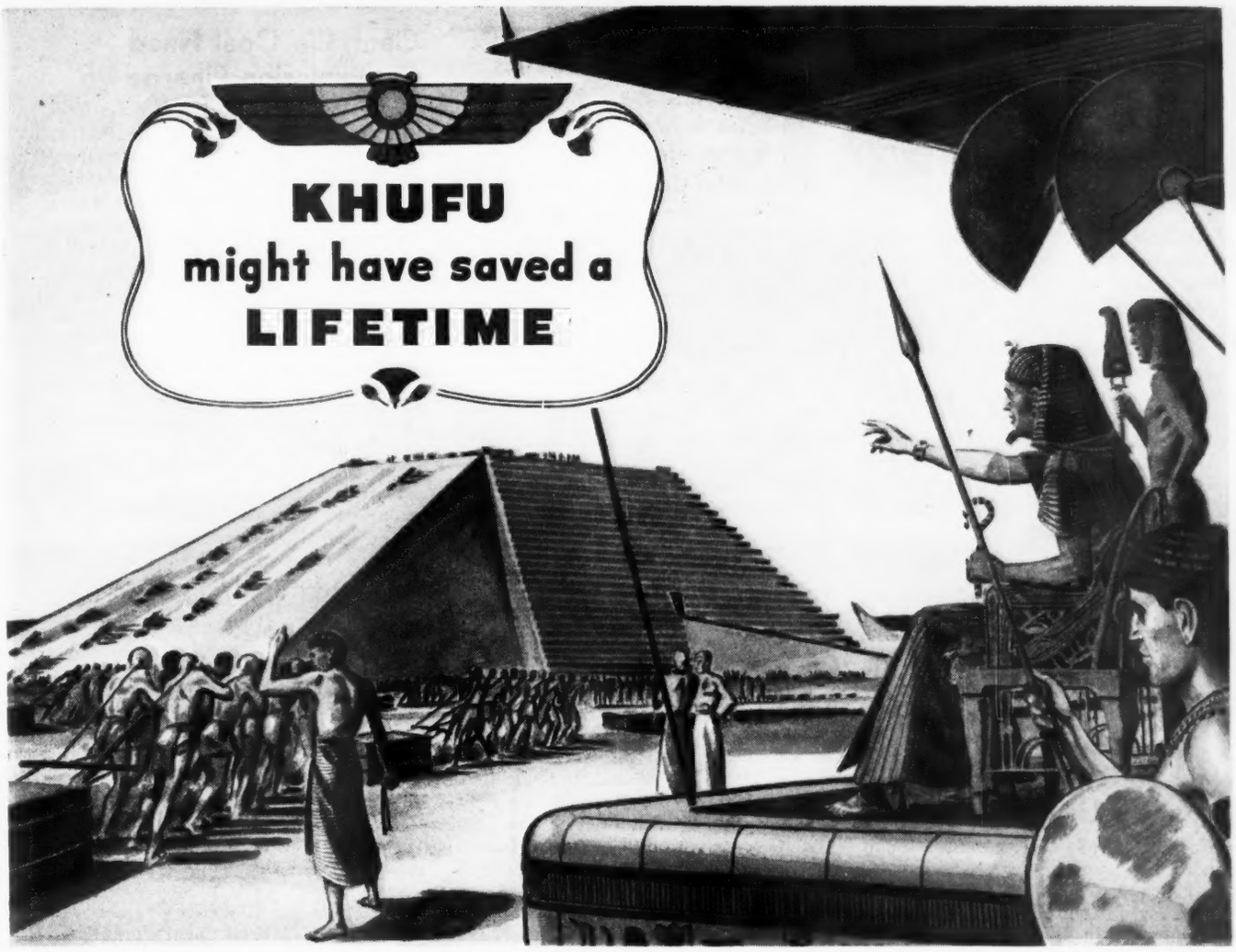
Mr. Chellson brings to his new post a varied and extensive experience in mining in many parts of the world. Previous to rejoining McGraw-Hill in October, 1943, he had served as editor of *Mining Congress Journal* and for some years prior to that had been associate editor of *E. & M. J.* Before joining the staff of *E. & M. J.*, he had been engaged in mining engineering, geology and operations in several parts of the United States, Mexico and Asia. He is a graduate of the New Mexico School of Mines.

Mr. Ginder, who is a graduate of Notre Dame in chemical engineering and metallurgy, was associated with the Carnegie Illinois Steel Corp. in the operating, metallurgical and sales departments. He is a registered professional engineer and is a member of the American Institute of Mining and Metallurgical Engineers, Coal Mining Institute of America, Illinois Mining Institute and the Engineers Society of Western Pennsylvania.

Utah Operators Back Mine School Activity

Development of new courses and a program of cooperation with coal operators designed to more directly and effectively serve the coal industry of the region has been announced by the recently reorganized School of Mines and Mineral Industries of the University of Utah, under Dean Carl J. Christensen.

First step in the program has been



KING KHUFU had only *slave*-power with which to build the greatest of the pyramids. With engine-power, he might have saved a lifetime and the lives of 300,000 slaves.

Today, mightier and much more useful structures spring from dream to drawing board to reality in relatively short spans of time. Modern construction equipment powered by internal-combustion engines makes this possible. For today, the machine is the slave of man. Great dams, soaring bridges, towering buildings and broad highways are ours without backbreaking toil and wasted flesh and blood.

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the establishment of a revamped course in coal-mining engineering and a new department of fuel technology. The University's objectives recently were submitted to the coal operators in the region and their support through scholarships, summer employment and research was requested. Their response, according to school officials, was immediately and enthusiastically forthcoming. Within a few days a tour was arranged for more than 30 engineering students to visit three coal mines in the state: the Utah Fuel Co.'s mine at Castlegate; the Independent Coal & Coke Co.'s mine at Kenilworth; and the U. S. Fuel Co.'s mine at Hiawatha.

Immediate support of the enlarged activity also come from the Utah Fuel Co., Salt Lake City, whose president, Moroni Heiner, wrote the University June 4, donating $2,000 to set up two scholarships for outstanding students specializing in the fields of coal-mine engineering and fuel technology. Each of the scholarships is to pay the recipient $500 a year for two years and is set up to assist "in the establishment of the School and the popularizing of the work in these two fields."

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New Foremen's Union Replaces U.M.W. Group

Formation of a new independent supervisors' union, to be known as the Clerical, Technical and Supervisory Association of America, with headquarters in Morgantown, W. Va., was announced late last month. It was to replace the old United Clerical, Technical and Supervisory Employees of the Mining Industry, affiliated with District 50, U.M.W., whose end was ascribed by John McAlpine, president, to the Taft-Hartley Act. Samuel Willetts, Morgantown, was elected president of the new group.

EQUIPMENT APPROVAL

One approval of permissible equipment was issued by the U. S. Bureau of Mines in June, as follows:

Goodman Mfg. Co.—Type G-20 shaker conveyor; 20-hp. motor, 3-phase, 50-cycles, 500-volts, a.c.; Approval 581A; June 12.

Dr. Sayers Heads Union Medical Board

The appointment of Dr. R. R. Sayers as chairman of the medical advisory board established under the U.M.W.A. bituminous welfare fund was announced July 27. In his new position, Dr. Sayers, who has been granted a leave of absence from the U. S. Public Health Service, will advise the fund trustees on health and welfare problems and work with operators, the union and various local and state authorities to carry out the recommendations of the government's medical survey issued last spring.

Dr. Sayers had resigned July 14 as director of the U. S. Bureau of Mines to return to the U. S. Public Health Service as medical director, the position he left in 1940 to head the Bureau. Dr. Sayers had originally planned to leave the Bureau April 1, but delayed his departure on the request of President Truman when the confirmation of James Boyd as the new director was held up. Mr. Boyd's nomination was bitterly protested by John L. Lewis in two appearances before the Senate Public Lands Committee and is still awaiting action by that group. Thomas H. Miller, assistant director of the Bureau, becomes acting director until a successor to Dr. Sayers is confirmed.

Centralia Coal Fined On Explosion Charge

The Centralia Coal Co. was fined $1,000 in the Washington County (Ill.) Circuit Court July 8 on charges of "willful neglect" in connection with the explosion at its No. 5 mine March 25. The fine, which was the maximum provided under the statutes, was imposed by Judge R. W. Griffith, after the company entered a plea of nolo contendere, by which, without admitting guilt, the company submitted itself to a judgment or conviction.

At the same time, the court delayed a ruling on the plea for a change of venire entered by Robert M. Medill, former director of the Illinois department of mines and minerals, and Robert Weir, assistant director. Medill and Weir, who have been charged by grand jury indictments with omission of duty for supposed failure to enforce the law in regard to rock-dusting at the mine, have asked for a trial in "a county where there is no coal mining influence," on the basis that prejudice against them exists in Washington County.

•

Smoke Control Law Adopted in Akron

A smoke control ordinance, effective July 15, requiring immediate compliance on all new heating equipment installed and permitting five years for compliance by home owners and industry on present equipment, has been passed by the Akron, Ohio, city council. Heating-plant owners who take advantage of the five-year period must show that they have made one-fifth progress each year in complying with the ordinance. The new regulation, similar to those passed in other cities, will be administered by a nine-member smoke-control board.

New Coal-Burning Steam-Turbine Electric Locomotive on Display

FIRST OF A NEW coal-burning type is this 6,000-hp. steam-turbine electric locomotive on display at the recent Railroad Show at Atlantic City. The first of three being built by the Baldwin Locomotive Works for high-speed, deluxe passenger service on the Chesapeake & Ohio Ry., the locomotive and tender together weigh almost 600 tons and have an over-all length of 150 ft. The 6,000-hp. developed in the Westinghouse turbine is converted by generators into 4,000 kw. of electricity to drive traction motors geared to the axles. The locomotive is capable of speeds up to 100 m.p.h. and "its uniform power flow at all speeds will fully match any self-propelled motive-power unit now on the rails," according to Baldwin.

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Utility Seeks to Buy Coal Town Systems

Completion of negotiations to purchase 11 small power-distribution systems owned by coal companies and serving various coal-mining communities was revealed last month in petitions filed with the West Virginia Public Service Commission by the Appalachian Electric Power Co. The price for the 11 companies involved totalled $107,756.57.

According to the petitions, the power systems involved are owned by the Island Creek Coal Co., Gauley Mountain Coal Co., Fayette Utilities Co., New River & Pocahontas Coal Co., Wyatt Coal Co., Glogora Coal Co. and Black Eagle Smokeless Coal Co.

•

Central W. Va. Group Shown Safety Equipment

An explanation of war-developed mine-rescue equipment, supplemented by two color films, was presented before 125 members and guests attending the meeting of the Central West Virginia Coal Mining Institute, June 19, at Fairmont. The lecture and films were presented by C. M. Donahue, sales manager, mining department, Mine Safety Appliances Co., Pittsburgh, accompanied by H. R. Johnson, Uniontown, Pa. and C. V. Miller, Fairmont.

One of the color films was the first taken of the coal and methane explosion demonstrations staged at intervals by the U. S. Bureau of Mines in its experimental mine at Bruceton, Pa. The second film dealt with experimental work being conducted in fighting coal fires.

Members of the institute, at the July 18th meeting in Clarksburg, heard David E. Renshaw, industry electrical engineer, Westinghouse Electric Corp., Pittsburgh, discuss "Power for Underground Mines."

The next meeting of the institute was announced for Aug. 22 at the Fairmont Hotel, at which time C. E. Bailey, transportation division, General Electric Co., will present a paper on "The Railroad Outlook" George McCaa, chairman of the committee, also announced that the annual banquet would be held Saturday, Sept. 20.

•

Mineral Producers Group Holds Annual Meeting

Election of five directors and afternoon and evening sessions devoted to discussions featured the June 27th meeting of the Mineral Producers' Association, held at Pittsburgh, Pa., and attended by more than 300 members and guests.

The following directors were elected for two-year terms: R. R. Bowie, Bowie Coal Co., Grove City, Pa.; John R. Brunot, Irwin Gas Coal Corp., Greensburg, Pa.; W. A. McBride, Jefferson Coal & Coke Corp., Burgettstown, Pa.; R. S. Walker, Bradford Coal Co., Bigler, Pa.; and F. B. Wood Sr., F. B. Wood Coal Mining Co., Barnesboro, Pa.

At the afternoon session, with R. S. Walker, Bradford Coal Co., Bigler, Pa., vice president of the association, presiding, papers on explosives were presented by John Jeffries, Atlas Powder Co., and Don B. McCloud, DuQuoin, Ill. Allen O. Geertz, fuel engineer, Pennsylvania R. R., spoke on "What Is This Fuel Called Coal," recommending certain types of preparation to facilitate utilization. M. A. Crawford, general counsel of the association, and Milton Carr Ferguson, attorney at law, Washington, D. C., spoke on recent legislation affecting the industry. Harry Gandy Jr., National Coal Association, described at some length the provisions of the Taft-Hartley Bill.

At the dinner session, Mr. Bowie presided and R. T. Laing, executive secretary of the association, served as toastmaster. Speakers included Richard Maize, secretary, Pennsylvania Department of Mines, O. Ben Gipple, Department of Forests and Waters, and the Hon. Leon H. Gavin, Member of the United States Congress.

Mine Fatality Rate Drops in May

Accidents at coal mines in the United States caused the deaths of 64 bituminous miners and 11 anthracite miners in May, 1947, according to reports furnished the U. S. Bureau of Mines by state mine inspectors.

For the two industries combined, in producing 61,349,000 net tons, the preliminary fatality rate in May, 1947, was 1.22 per million tons, considerably less than that of 1.83 for April, 1947, and that of 1.43 for May, 1946, later revised to 1.77.

With a production of 56,800,000 tons, the preliminary bituminous fatality rate was 1.13 per million tons in May, markedly lower than the latest rate of 1.63 for April, 1947, and also less than the revised rate of 1.36 for May, 1946.

The preliminary anthracite rate for May, 1947, in mining 4,549,000 net tons, was 2.42 per million tons, more than 50 percent less than the April rate of 3.74 and considerably less than the revised rate of 3.29 for May, 1946.

May, 1947, fatalities, by causes and states, and comparable rates for the first five months of 1947 and 1946, were as follows:

U.S. COAL MINE FATALITIES IN MAY, 1947, BY CAUSES AND STATES

State	Underground: Falls of roof	Haulage	Electricity	Machinery	Other causes	Total underground	Opencut	Surface	Grand total
Alabama	1	1	..	1	..	3	..	..	3
Colorado	1	1	..	..	..	2	..	..	2
Illinois	3	..	1	..	..	4	1	..	5
Indiana	3	1	..	..	..	4	..	..	4
Kentucky	6	3	..	..	..	9	..	..	9
Montana	..	1	..	..	..	1	..	..	1
Ohio	1	..	..	..	..	1	..	..	1
Penna. (Bituminous)	6	2	1	1	1	11	..	..	11
Tennessee	1	1	..	..	..	2	..	..	2
Utah	..	..	..	..	..	..	..	..	..
Virginia	..	..	..	..	3	3	..	..	3
West Virginia	13	2	1	1	1	18	..	1	19
Total Bituminous	39	12	3	3	5	62	1	1	64
Penna. (Anthracite)	4	5	..	..	..	9	..	2	11
Total	43	17	3	3	5	71	1	3	75

DEATHS AND FATALITY RATES AT U.S. COAL MINES, BY CAUSES OF ACCIDENTS*, JANUARY-MAY, 1947 AND 1946

Cause	Bituminous: Number Killed		Bituminous: Killed per Million Tons		Anthracite: Number Killed		Anthracite: Killed per Million Tons		Total: Number Killed		Total: Killed per Million Tons	
	1947	1946	1947	1946	1947	1946	1947	1946	1947	1946	1947	1946
Underground:												
Falls of roof and face	192	149	0.732	0.801	32	51	1.380	1.975	224	200	0.784	0.944
Haulage	92	52	.350	.279	9	13	.388	.504	101	65	.354	.307
Gas or dust explosions:												
Local	4	..	.015	....	..	..	....	....	4	..	.014	....
Major	119	27	.454	.145	25	..	1.078	....	144	27	.504	.127
Explosives	9	4	.034	.022	4	4	.173	.155	13	8	.046	.038
Electricity	4	3	.015	.016	..	2	....	.077	4	5	.014	.024
Machinery	14	7	.053	.038	..	1	....	.039	14	8	.049	.038
Shaft	2	2	.008	.011	1	1	.043	.039	3	3	.011	.014
Miscellaneous	6	11	.023	.059	1	9	.043	.349	7	20	.024	.094
Total underground	442	255	1.684	1.371	72	81	3.105	3.138	514	336	1.800	1.586
Stripping or opencut	9	10	.034	.054	3	5	.129	.194	12	15	.042	.071
Surface	19	21	.073	.112	10	6	.431	.232	29	27	.101	.127
Total	470	286	1.791	1.537	85	92	3.665	3.564	555	378	1.943	1.784

*All figures are subject to revision.

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MINING MACHINE AND LOCOMOTIVE CABLES

J. J. Foster (left), general manager, Island Creek Coal Co., and president, West Virginia Coal Mining Institute; H. S. Galpin, hydrologist, West Virginia University; Jesse Redyard, president, Redyard Coal Co., and vice president of the institute; W. L. Wearly, service manager, Joy Mfg. Co.; and G. B. Walker, assistant director, mineral dressing laboratories, American Cyanamid Co.

Geo. R. Higinbotham (left), vice president, Consolidation Coal Co. (W. Va.) and vice president, West Virginia Coal Mining Institute; E. J. Gleim, supervising engineer, electrical-mechanical section, U. S. Bureau of Mines, Pittsburgh; Thomas R. Weichel, mining-electrical engineer, U. S. Bureau of Mines, Mt. Hope, W. Va.; George C. Barnes Jr., associate professor of electrical engineering, Virginia Polytechnic Institute, and associate editor, "Mechanization"; A. Lee Barrett, maintenance engineer, Pittsburgh Coal Co.; and Charles R. Nailler, vice president, Consolidation Coal Co. (W. Va.).

Belts, D.C. Grounding and Heavy Media Discussed by West Virginia Institute

SHUTTLE CARS loading onto belts, frame grounding of d.c. machinery, heavy-media separation for bituminous coal and studies of overburden at Pittsburgh-seam strip mines occupied the sessions of the West Virginia Coal Mining Institute, held at Fairmont, W. Va., June 20. J. J. Foster, general manager, Island Creek Coal Co., called the meeting to order and presided at the luncheon and dinner. Jesse Redyard, president, Redyard Coal Co., was chairman of the morning session and Geo. R. Higinbotham, vice president, Consolidation Coal Co. (W. Va.), was chairman in the afternoon.

Charles T. Holland, professor of mining engineering, West Virginia University, was elected secretary-treasurer, replacing G. R. Spindler, Joy Mfg. Co., in Europe on an extended business mission. On behalf of the West Virginia Coal Association, Robert Norcross, Charleston, presented Mr. Spindler in absentia an engraved watch in recognition of his many contributions to the coal industry. Professor Holland received the watch for Mr. Spindler.

Entertainment at the speechless dinner consisted of musical numbers and Mrs. Charles T. Holland was one of the vocalists. Saturday-morning inspection trips were made to Owens-Illinois Glass Co., Domestic Coke Corp. and Penn Dola Coal Co. The group choosing the coal company trip saw a Pittsburgh-seam strip mine about 15 miles east of Clarksburg producing 5,000 tons of coal per day from one pit. R. L. Satterfield, Morgantown, W. Va., vice president of this company, conducted the tour.

Belt capacities was the first topic on the list of papers. W. L. Wearly, service manager, Joy Mfg. Co., using a blackboard chart, explained the selection of belt sizes and speeds for receiving coal from shuttle cars under various conditions of seam thickness, character of the coal, mine layout and machinery used.

First, he assumed 44-in. coal, 300-ft. rooms worked off butt headings, room-neck loading, two producing units, four shuttle cars and a potential capacity in the longer (250-ft.) rooms of 400 tons per shift and in the shorter (150-ft.) rooms, 500 tons per shift, a total of 900 tons to be handled by the belt.

In the longer rooms, the two cars will make 104 round trips and in the shorter 130 round trips and, unless there are some restrictions imposed, two shuttle cars will be delivering to the belt simultaneously an average of 26 times per shift. With 4-ton shuttle cars unloading in 40 seconds, the belt must repeatedly handle slugs of 12 tons per minute as compared to 2.2 tons if the 900 tons per shift or 133 tons per hour was moved at a uniform rate.

If loading is done over the end of the belt, the capacities shown in the accompanying table can be stepped up 30 to 40 percent. Therefore, the 36-in. belt operating at 450 f.p.m. probably would handle the coal. Instead, however, it will likely pay to delay one shuttle car 30 seconds or so, so that the belt will not have to carry over 6 tons per minute. According to the table, that permits use of a narrower and/or slower belt.

Next, Mr. Wearly assumed 6-ft. coal and 7-ton shuttle cars, in which

Belt Capacities With Average Loads—Loading Done From the Side

Feet per Minute	30-In. Belt		36-In. Belt	
	Tons per Hour	Tons per Minute	Tons per Hour	Tons per Minute
150	120	2	175	2.9
300	235	3.9	350	5.8
350	275	4.6	410	6.8
400	315	5.2	465	7.7
450	355	5.9	525	8.7

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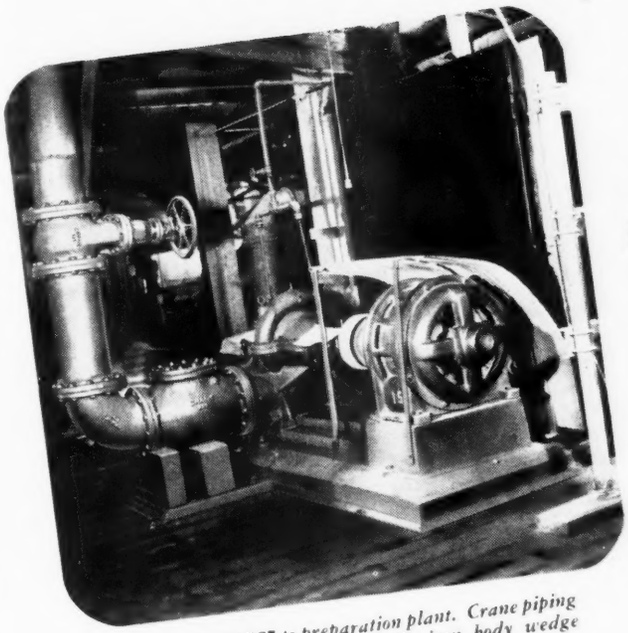
case the two cars in the longer rooms would make 86 trips per shift and deliver 600 tons, and the two cars in the shorter rooms 104 trips, delivering 720 tons, or a total of 1,320 tons per shift. Cars in the shorter rooms can make a trip in 4.5 minutes but have 4.9 minutes in which to do it. Therefore each of these two cars can be delayed 0.4 minute before starting to unload after reaching the belt, thus preventing two cars discharging onto the belt at the same time.

One car discharges at the rate of 13 tons per minute as compared to a calculated average flow of 3.3 tons per minute to handle 1,320 tons per shift. Assuming loading over the end of the belt, thus adding 40 percent to the capacities of the table, and delaying car discharging a little, it is then indicated that a 36-in. belt is required. But, if only one shuttle car is to be used per loading unit, a 30-in. belt will suffice.

If a restricting or feeding device is used at the belt so that the shuttle car can discharge immediately and thus the coal can be fed to the belt at a slower rate, there is the possibility of stepping back one size in belt width or adding more loading units to the belt section. A feeding device loading over the end of the belt provides a more uniform loading. Mr. Wearly then showed a slide illustrating a hopper-and-chain conveyor feeding over the end of the belt. Against the advantage of using the belt more favorably is the disadvantage that the device lacks the mobility that would permit using one of them at each room neck. Another illustration consisted of a drawing of a hopper and shaker-conveyor feeder in which the feed rate can be governed by adjusting the inclination of the shaker conveyor.

Next, Mr. Wearly considered a main-line belt being fed from section belts loaded at fairly uniform rates by feeding devices. Three types of mechanisms are in use for automatically stopping a section belt when the main belt already is loaded as it is passing that point. One type uses an arm actuated by belt deflection between rollers. Another consists of a belt-weighing device. A third comprises an electric eye sensitive to the height of load on the belt.

Answering questions, Mr. Wearly said that large lumps definitely limit capacity when loading over the side of the belt but have little or no effect when loaded over the end. With large lumps, belt tension must be kept high to reduce deflection. With belts of cushion construction, a number of small steel rollers close together sometimes are used at the loading point. In some other cases, pneumatic rollers are used. Probably 40 to 50 mines now operate with shuttle cars delivering directly to belts and probably 10 mines are using feeding devices consisting of chains or shakers, both of which are a development of about the last two years.



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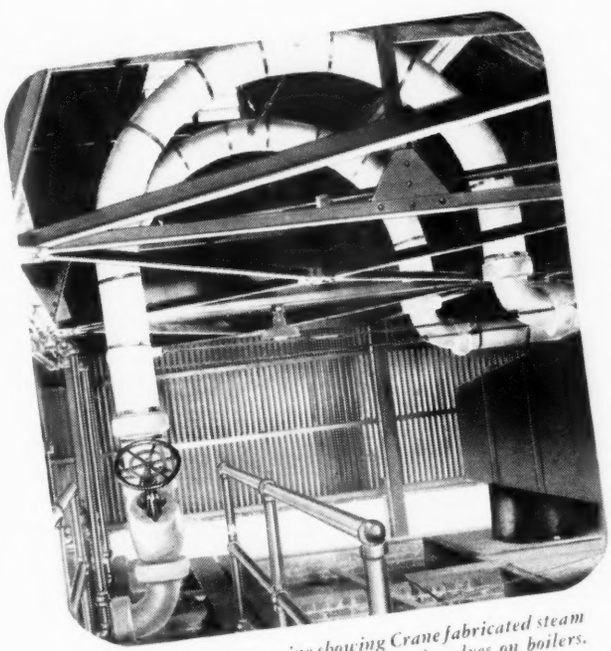
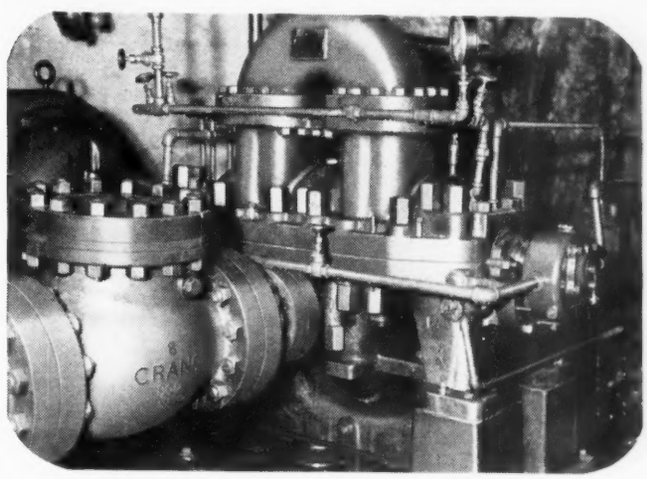


POWER PLANT *in a zinc mine showing Crane fabricated steam header piping and Crane steel stop-check valves on boilers.*



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Technical data on Dutch State Mines Processes and Apparatus have been transmitted to the American Cyanamid Company.

The Cyanamid Mineral Dressing Laboratory at Stamford, Connecticut, U.S.A. is now equipped to make large-scale, continuous tests using the Dutch State Mines Cyclone. Technical descriptions of this apparatus and its performance are to be found in *Mining and Metallurgy, December, 1946; Coal Technology, February, 1947, and Coal Technology, August, 1947.*

Mineral and coal producers interested in securing additional information on Dutch State Mines Processes and Apparatus, or in having testing work initiated, should correspond with

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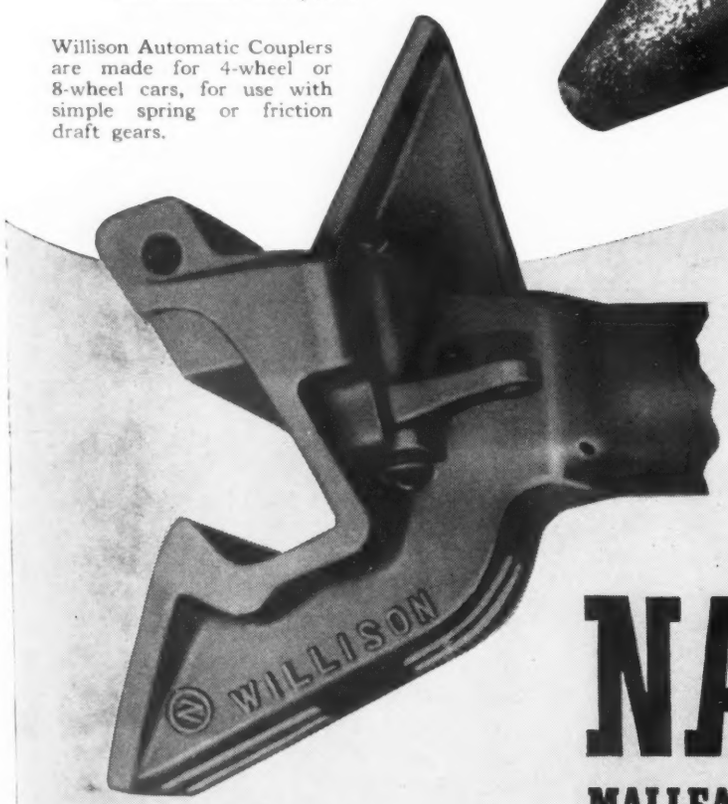

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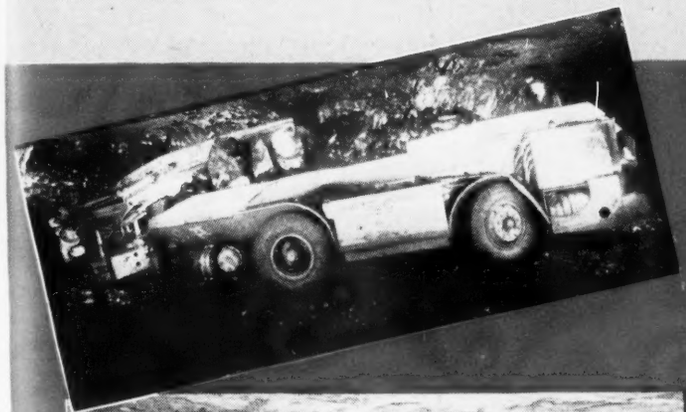

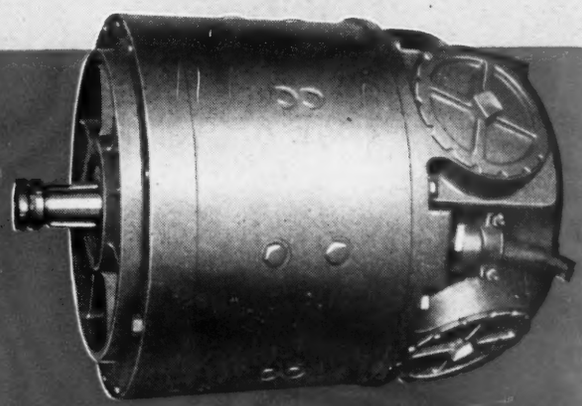

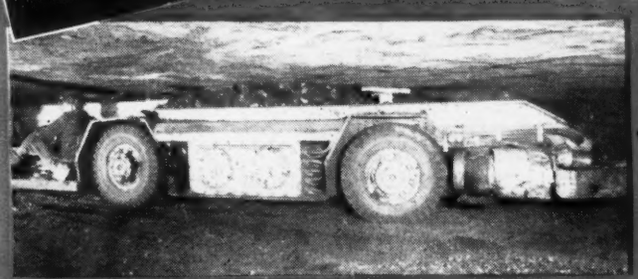

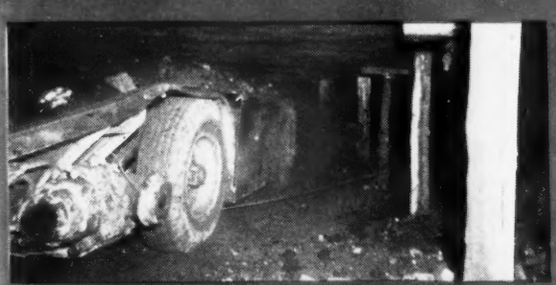

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GENERAL ELECTRIC

A suggestion from the floor was to the effect that with either the arm or the electric-eye stopping arrangements, the devices should be placed in pairs a few feet apart so that belts will not be stopped or started too often. Mr. Wearly agreed that this double arrangement is necessary.

Underground mining men will learn more about mine roofs by examining strip mines than they will ever learn underground, said S. L. Galpin, hydrologist, West Virginia University, in a slide-illustrated talk on overburden materials of the Pittsburgh seam. He has made a study of the highwalls and overburden materials at numerous strip mines in the Pittsburgh seam from the standpoint of revegetation but included observations on underground mining.

Where there is limestone in the overburden, the spoil banks generally contain everything but nitrogen and so are easily vegetated. This is not so with the overburdens of shales and clays that lack limestone, however. Because his talk was directed to the interests of underground operators, observations relative to revegetation were limited to that.

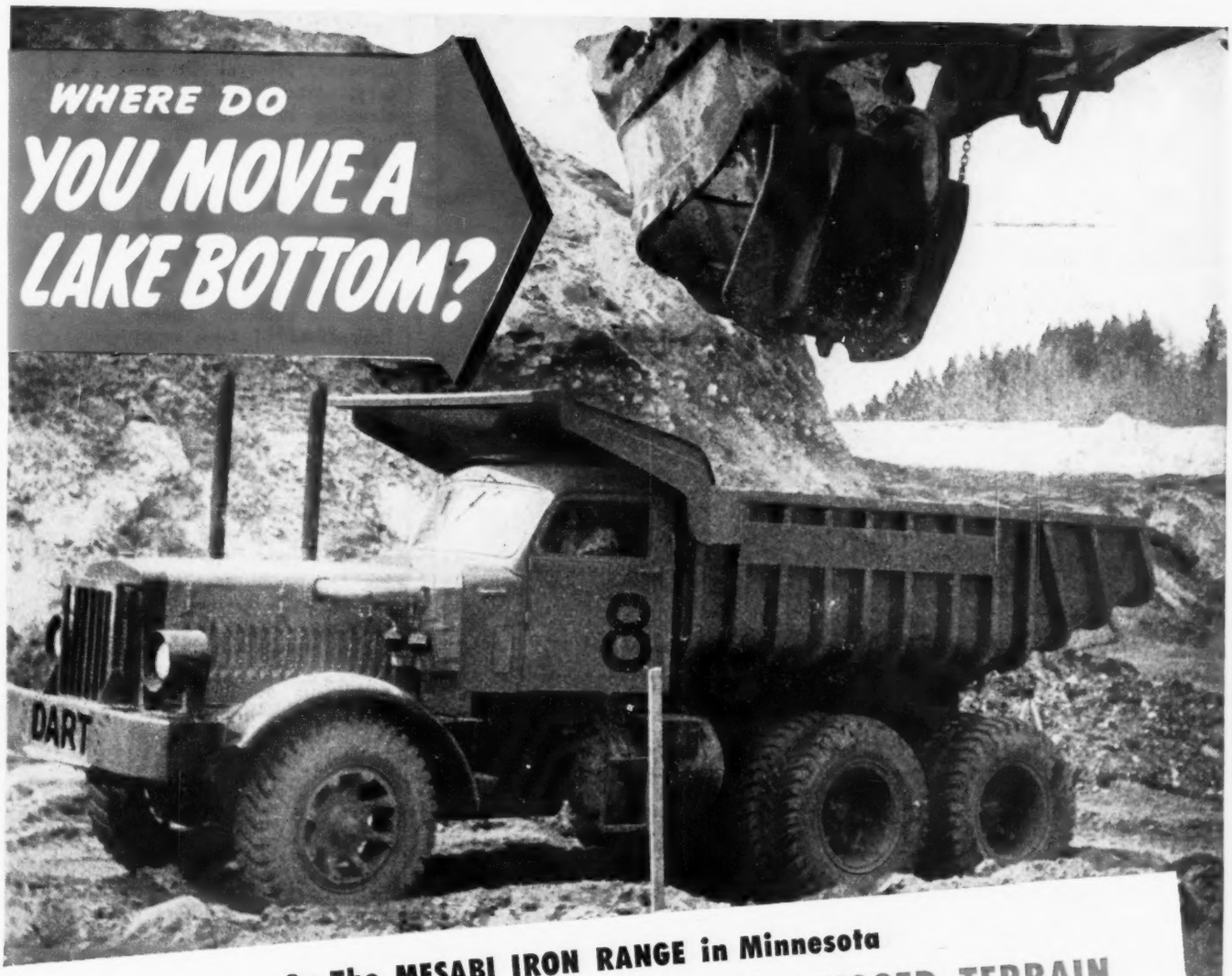
The following coal-seam irregularities were observed by Mr. Galpin: mud seam, depression in top, clay dike, channel fill, scour-and-fill and squeeze from top. Overburden sections in different localities indicate the borders of a huge lake over the Pittsburgh seam area and a regular sequence of different overburden sections as the edge of that lake is approached. At Horner Run, a section showed nearly all shale. A section six miles southwest of Bridgeport, W. Va., indicates clay showing up. A section at Ocean shows some limestone and a section at the Country Club shows limestone extending almost down to the coal. These are local sections in the vicinities of Fairmont and Clarksburg. In other places, sand constitutes nearly all the overburden.

The worst roof feature from the standpoint of underground mining is a clay material which presents slicken-sides and which falls to pieces if the moisture content is changed. Dangerous is a massive-appearing roof with close above it a clay that can cause falls.

Frequently, joints are not continuous vertically through different materials. Joints are well defined in the soapstone types of shales, while in other types the number of joints range from a few to a great many. Joints in the rocks affect the quantity of water that gets into a mine and that water will contain acid unless it comes through limestone. Character of overburden varies widely even at mines only two miles apart.

Answering a question, Dr. Galpin said he has not been able to find any correlation between the percentage of sulphur in coal and the occurrence of limestone in the overburden.

A comprehensive paper with a num-



On The MESABI IRON RANGE in Minnesota

"TONNAGE ENGINEERED" DARTS WORK RUGGED TERRAIN TO TRUCK LAKE BOTTOM UP 12° GRADES 18 TONS AT A TIME

This Dart Truck, and many more like it, is doing a big job on the Mesabi. Ore from the lake bottom is lifted by these Darts to surface hoppers some of which are well over 400-ft. above pit bottom; 8° to 12° grades are common; 36000 pounds is the normal Dart load each trip.

"Tonnage Engineering" by Dart fits trucks to typical jobs such as this. Power and construction are engineered to move more tonnage per investment dollar. On or off the highway—regardless of operating conditions, Dart Trucks are engineered for 5 to 80 ton payloads.

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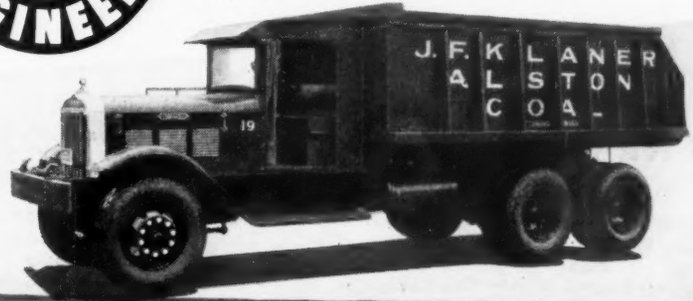

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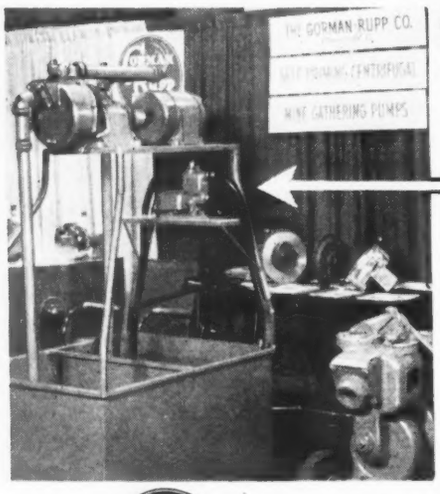

You Saw It At The Coal Show in Cleveland

The "Handy" Pump's remarkable performance created a great deal of interest there. (See arrow at left.) The pump shown on top of the display is the Gorman-Rupp Model 9263 pump – the most dependable and trouble-free mine gathering pump made – five different sizes and capacities for any requirement. Ask for Mine Bulletin No. 301-46.

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ber of tables and drawings was presented by G. B. Walker, assistant director, Mineral Dressing Laboratory, American Cyanamid Co., on cleaning bitumious coal by heavy-media separation. In the mineral industry, he said, 15 heavy-media plants are now treating 2,000,000 tons of 10 different ores per month and eight added plants are being built.

Mr. Walker reported that a pilot installation at Pittsburgh Coal's Champion No. 1 plant has been a complete success. There, because of limitations of feed equipment, only 200 tons per hour was available as feed to the pilot plant. Now the plant is to be moved to a new location where 450 to 500 tons per hour can be fed to it. Magnetite in water comprises the heavy medium. Flocculation to increase settling rate of the magnetite in the washings, which consist of water, magnetite, fine coal and fine refuse, is attained by passing the washings through magnetizing blocks. By magnetic separators, the magnetite is then recovered from the thickened washings. After being passed through a demagnetizing coil to bring about deflocculation the reclaimed medium is ready for re-use.

Tables of test data, presented to indicate high efficiency of cleaning, demonstrate that tonnage fluctuations of feed are not critical, show that bank loss with feed cut on and off is small and indicate that performance still is good with greatly increased percentages of refuse in the feed. From the standpoint of water clarification, Mr. Walker gave it as his opinion that the volume of fire clay in sludge is in proportion to the time the material is in the cone. Four to five seconds is the time in the cone and in 20 to 30 seconds the time the material is out of the circuit entirely.

While 10-mesh was the bottom size that could be handled because of a limitation in the fineness of the screen used for medium drainage and washing, a twin cleaning circuit has been developed that permits feeding the cone with full size range coal.

Mr. Walker estimated that the present f.o.b. factory cost of equipment for a 100-tons-per-hour 1x¼-in.-feed heavy-media separation plant at $41,468. The connected horsepower is 201½. Based on experience on the Iron Range, the operating cost (labor, power, medium and supplies) is estimated at 5.33c. per ton of coal. He mentioned that arrangement of a plant is such that one operator can watch everything.

Preliminary to a symposium on frame grounding of d.c. underground machinery, Thomas R. Weichel, mining-electrical engineer, U. S. Bureau of Mines, Mt. Hope, reported on his recent study to classify the accidents from electrical causes in the coal industry of the United States and especially in West Virginia. The result shed little light on the importance of frame grounding because electrical accidents have been report-

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ed without enough detail to allow proper classifications.

Picking at random from Mr. Weichel's report, in the period 1939 to 1943, inclusive, in West Virginia, during which time fatalities from electrical sources or failures totaled 272, the general causes and number of men were as follows: arc from cable splice, 168; contact with wire or other bare parts, 53; ignition of gas or coal dust, 29; sparking of open-type cutting machines in gassy atmospheres, 6; contact with a conduit or frame, 6; premature blasts from stray currents, 4; handling defective trailing cable, 2; roof fall breaking a grounding conductor, putting 440 volts a.c. on a mining machine, 1; insulation failure of an electric drill, 1; remote control of a conveyor motor accidentally engaged, 1; and arc from a locomotive, 1.

George C. Barnes Jr., associate professor, Virginia Polytechnic Institute, and associate editor, *Mechanization*, reviewed his talks and writings on the subject of frame grounding, beginning with a talk at a meeting of the Kentucky Mining Institute, December, 1943. At that meeting when speaking principally of war measures to save copper, he mentioned that without using solid grounds on frames of certain equipment, such as shortwall mining machines, there is less chance of severe damage by insulation breakdowns with a chance of safer operation.

He maintained that rarely has an electrocution occurred from an ungrounded frame. He again cited certain Bureau of Mines statistics but this time, to be more conservative, eliminated certain figures and still came up with data to indicate that explosive accidents due to electricity run at least 706 percent above contact accidents. He believes that solid grounding of frames will increase explosive accidents and that nothing should be done to cause such an increase. He also called attention to the unreliability of fuses for protecting cables and machines and said that a circuit breaker can be developed for nip duty.

The subject of frame grounding is being overemphasized at this time, contended A. Lee Barrett, maintenance engineer, Pittsburgh Coal Co., Library, Pa. He feels that frame grounding contributes in a small measure to increased safety but that it increases operating problems. Among the disadvantages of frame grounding he listed are: (1) cables containing three wires must be larger and so will be harder to handle; perhaps it also will mean that open trolley wires will be used closer to the face; (2) the extra difficulty of splicing three-wire cable may cause more cable failures; (3) it is conceivable that with a three-wire cable the hot wire might be connected to the frame ground; (4) if voltage is not up to standard, current may overheat the cable instead of burning it open; and

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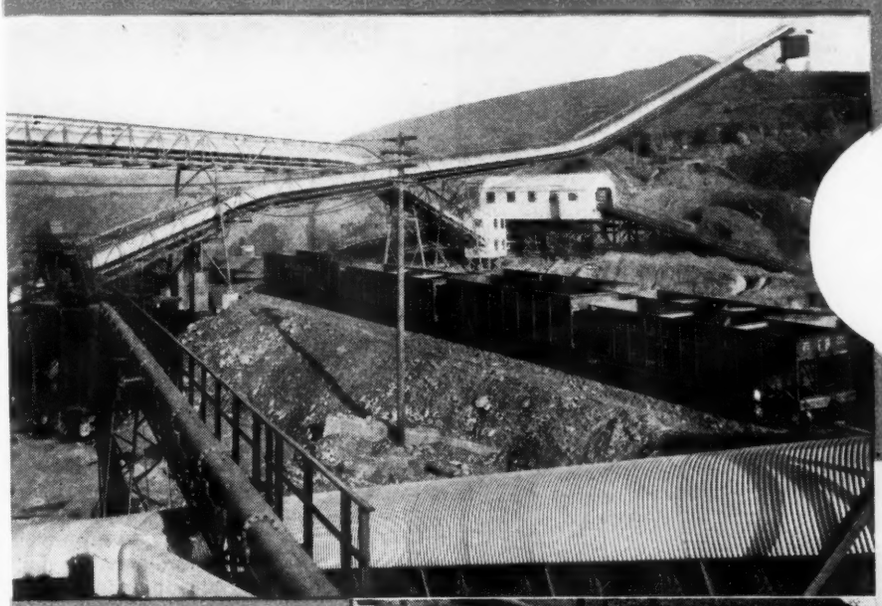
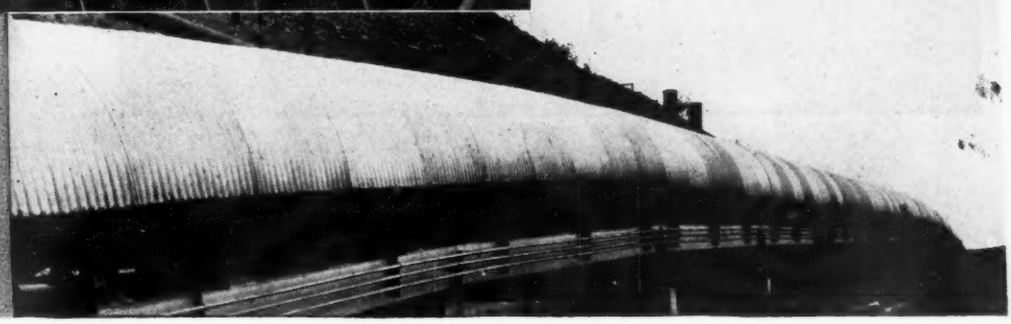
15 YEARS of SUMMER RAIN AND COAL DUST?



...ALCOA ALUMINUM CORRUGATED SHEETS



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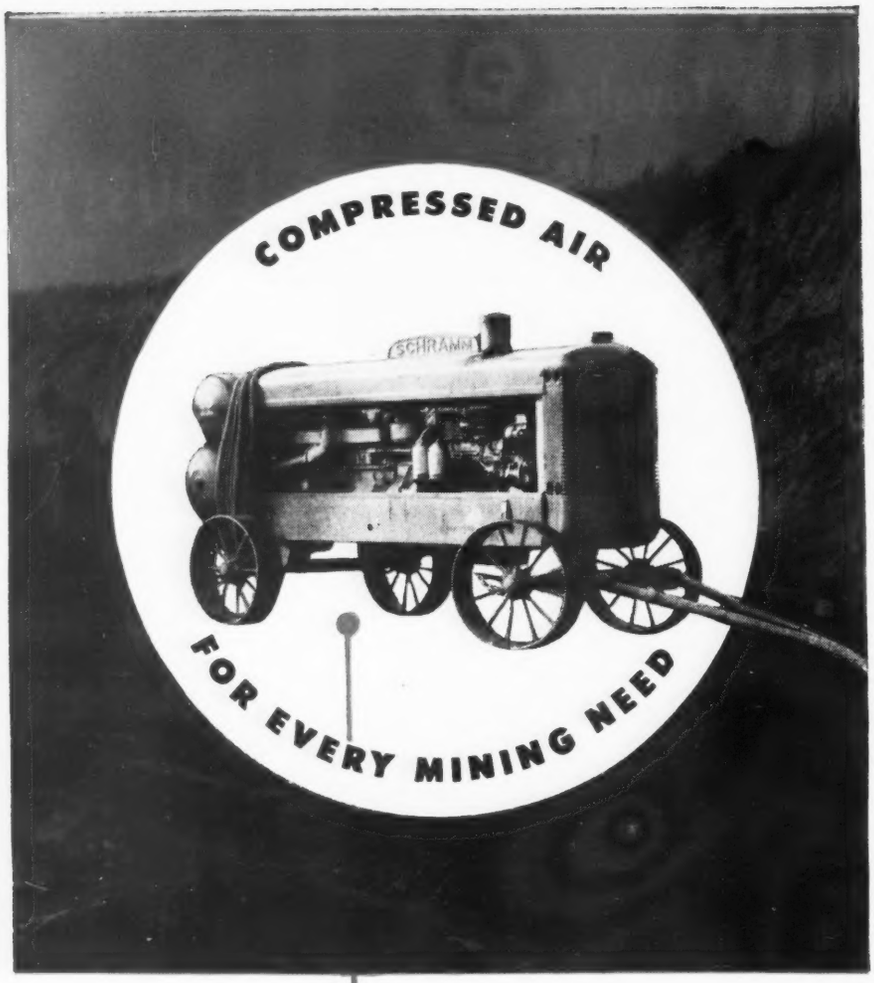

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(5) a careless operator may tie the power ground and frame ground to the same point and, if that point of connection to the rail is broken, the machine frame then is charged to full line potential.

Among the advantages of frame grounding, Mr. Barrett listed these: (1) less danger of shock from the frame of a machine to the rail; (2) an insulation failure in rubber-tired equipment may be fatal unless the frame is grounded; (3) an insulation failure in an ungrounded hand-held drill means that the frame is as hot as the trolley. He mentioned that crawler-mounted and shortwall machines ordinarily are rather well grounded by contact with the mine bottom. If they happen to be on dry bottom, the operator likely is also.

Mr. Barrett stated that his company has had no fatal accidents from any person touching the frame of a mining machine at the face. He, however, sees the same justification for grounding the frame of a machine at the face as for grounding conduits, motors, pumps and so on in stationary service. Disregarding arcs in cables, he thinks there is less danger from arcs in the face area with frame grounding than with ungrounded frames. Reminding the institute that he was talking from the standpoint of 500-volt d.c. systems, he said that any argument that frame grounding adds to insulation failures is refuted by the fact that many times during a shift the frame of a loading machine contacts that of a steel mine car standing on rails and at those times the loading machine is in effect frame grounded.

With a crawler loading machine delivering to rubber-tired shuttle cars, it is possible to get an arc with each contact unless frames are grounded. Fuses blow much quicker if frames are grounded, thus minimizing the danger of holes being burned through the cases. Tests in Pittsburgh Coal Co. mines indicate that rails on the mine bottom are naturally well grounded. Thus solid grounding of frames leaves little possibility of rails being raised to a dangerous potential in case of a break in the rail circuit outby.

Flashovers, Mr. Barrett said, are more likely to carry over to the case with solid grounding than without but the real solution is better circuit protection and this is far more important than grounding. In Pittsburgh Coal Co. mines, in a year, about 250 holes are burned through cases. Of those, about 100 burn from the inside but he thinks that at least 75 percent of that 100 have no relation to frame grounding.

Between 20,000 and 25,000 cable failures occur in a year and most of them are close to the face. The 15 to 25 holes burned in cases, and which have some relation to frame grounding, are an insignificant danger compared to the numerous cable failures. Mr. Barrett concluded by telling of

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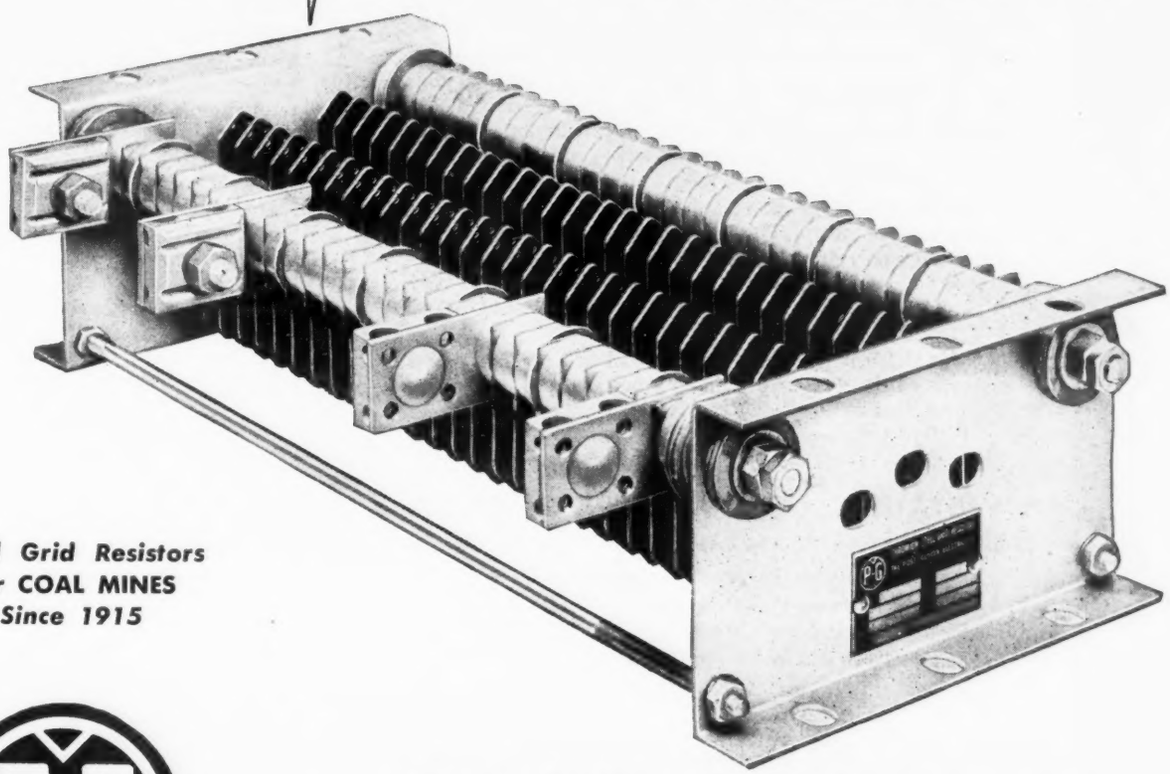

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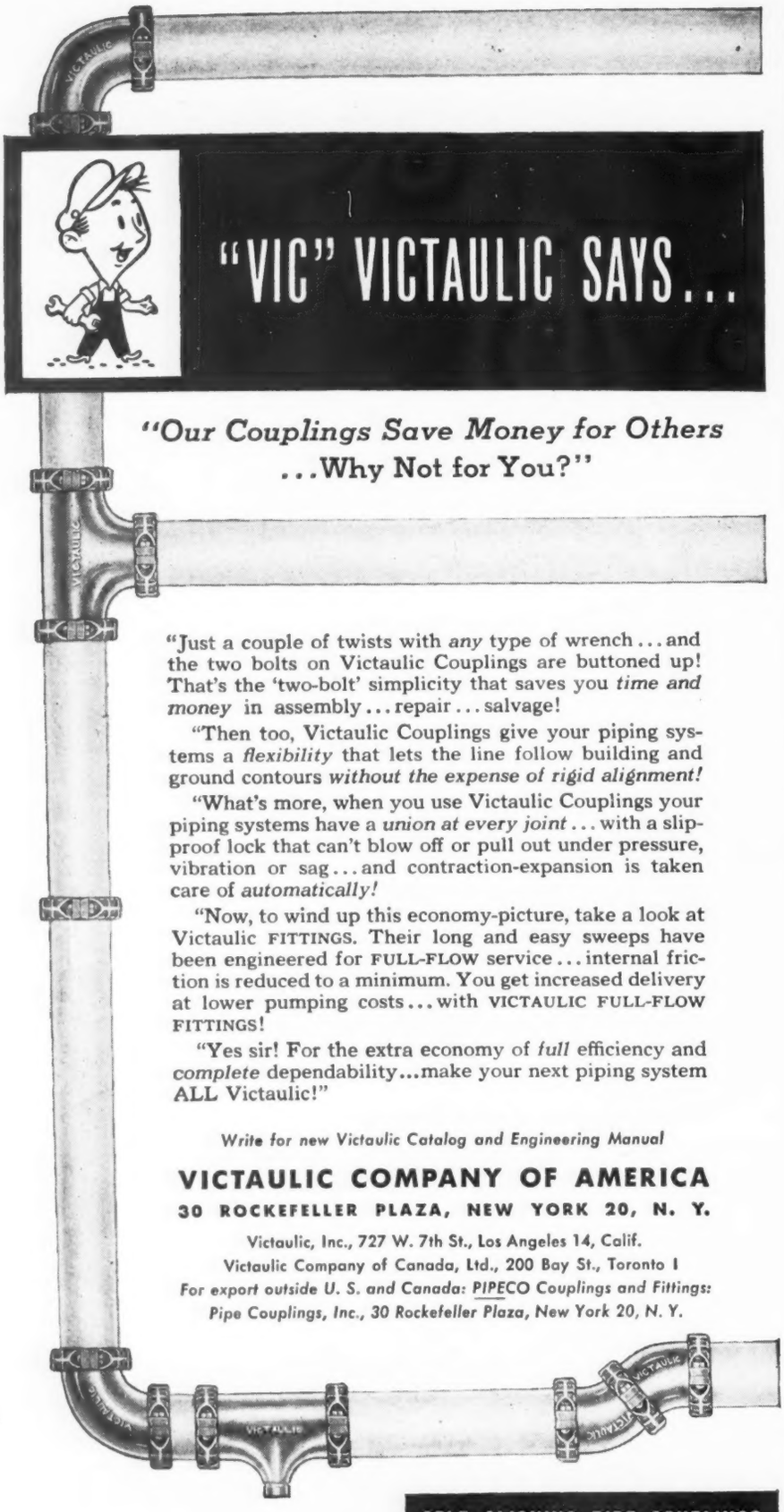
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trials his company has made during the last nine months on some new circuit breakers to protect cables. These circuit breakers open so quickly that in case of some cable failures the spot of the short does not show on the outside.

The U. S. Bureau of Mines first recommended frame grounding in 1926. Prior to that, however, many industries required it, especially in gassy and explosive atmospheres, stated E. J. Gleim, supervising engineer, electrical and mechanical section, U. S. Bureau of Mines, Pittsburgh. Frame grounding was required in English mines in 1911 and still is. Now, five of our states call for frame grounding. For permissibility, the U. S. Bureau now requires that frames be adequately grounded. The Bureau's attitude is governed by an over-all picture of the hazards of shock, ignitions and so on.

Frame grounding entirely from the standpoint of getting out coal was discussed by Charles R. Nailler, vice president, Consolidation Coal Co. (W. Va.). He opposed frame grounding in the belief that a thorough grounding program using three-wire cable will introduce many difficulties, add to the electrical shock accidents and, especially, will bring about more cable failures. He saw a necessity for some type of cable protection that is better than fuses and declared that frame grounding will not work until that better protection is provided. He called attention to the fact that the U. S. Bureau of Mines considers equipment operating on track as being effectively grounded.

Paul M. Barlow, Mines Equipment Co., sketched new circuit-breaker protection for cables and the equipment served therefrom, which has been tried and proved successful in several mines including a 500-volt property. This protective equipment is now available. In the 500-volt mine, the master mechanic reported that apparently the breaker cleared several flashovers before holes were burned in the case. In this arrangement, the grounding conductor from the case is arranged between conductors in the trailing cable and is connected in series with a relay that trips the breaker if but a few amperes flows through the ground wire. The breakers being used are standard three-pole units that operate at high speed.

F. E. Griffith, now with the Bureau, said that when he was electrical inspector for Pennsylvania he found many holes burned in explosion-proof cases without solid frame grounding.

At the close of the session, the institute approved a motion to have the executive committee make a study of frame grounding and offer recommendations, since most of the operators in West Virginia are getting red marks from the state inspectors and criticism from federal inspectors for not changing equipment to frame grounding.

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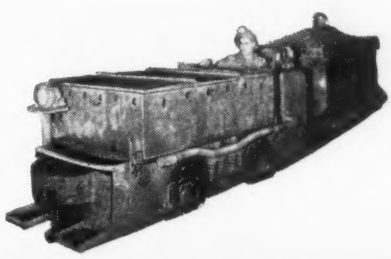
has been achieved in the new GOULD *"Twin Power"* BATTERY for faster runs and heavier loads in mine motive services

Simply expressed, "Twin Power" is a refinement in positive and negative plate balance that means more months of efficient service. It is a dividend of Gould research, which introduced and developed the famous Kathanode spun-glass construction for American mine locomotive and shuttle car batteries. For complete information write for Catalogs 200 and 300, Gould Storage Battery Corporation, Depew, New York.



For Gould Service call Gould in the following cities: Boston, Mass. . Cincinnati, Ohio Cleveland, Ohio . Chicago, Ill. . Denver, Colo. . Depew, N. Y. . Detroit, Mich. . East Point, Ga. . Kansas City, Mo. . Los Angeles, Cal. . New York, N. Y. . Philadelphia, Pa. Pittsburgh, Pa. . St. Louis, Mo. . St. Paul, Minn. San Francisco, Cal. . Washington, D. C. West Salem, Ore. . Kingston, Ont., Canada

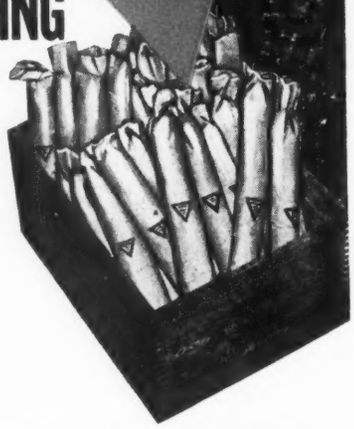
GOULD KATHANODE BATTERIES

PICKED BY ENGINEERS

For Gould Service in the Buffalo area contact K. A. Vaughan, Gould Storage Battery Corporation, Depew, New York.

KEEPS DUMMIES SAFE
from BREAKING and SPILLING

High wet strength and safety-seam for double safety



Blasting procedure is streamlined with dummies made with Seal-Tite Tamping Bags. Labor, time and cost is reduced . . . A supply of dummies is quickly and simply made up at one time — and stored underground, safe from breaking and spilling—in Seal-Tite Tamping Bags.

Under humid conditions, the *high wet-strength* chemically-processed Sealtite kraft won't tear or break—and the safety-seam won't open.

They're *tough*, too—they can stand the gaff in rough handling.

SEND FOR SAMPLES TO TRY OUT

Of course, you'll want to put them to the test. Send for free samples of Seal-Tite Tamping Bags in the sizes you want or we'll send an assortment of sizes—Just write!

Tamping Bag Co.

212 SO. THIRD ST.
MT. VERNON, ILL.

1947 Bituminous Contract

The following is the complete text of the 1947 bituminous coal wage agreement signed July 8 in Washington by representatives of the U.M.W. and those of the Northern Appalachian, midwestern and captive mine operators, comprising approximately 75 percent of the national production. The agreement was signed by southern and western operator representatives by July 11.

This agreement, made this 7th day of July, 1947, by and between the coal operators and associations signatory hereto hereinafter referred to as Operators, parties of the first part, and the International Union, United Mine Workers of America, hereinafter referred to as Mine Workers, on behalf of each member thereof, party of the second part, covering all of the bituminous coal mines owned or operated by said first parties, amends, modifies and supplements previous agreements as herein provided. This agreement (subject to the amendments, modifications and supplements as hereinafter provided) carries forward and preserves the terms and conditions of the Appalachian Joint Wage Agreement (dated June 19, 1941) effective April 1, 1941, to March 31, 1943, the Supplemental Six Day Work Week Agreement, the National Bituminous Coal Wage Agreement (dated April 11, 1945), effective April 1, 1945, and all the various District Agreements executed between the United Mine Workers of America and the various Operators and Coal Associations (based upon the aforesaid basic agreements) as they existed on March 31, 1946, subject to the terms and conditions of this agreement and as amended, modified and supplemented by this agreement as herein set out.

Witnesseth: It is agreed that this contract is for the exclusive joint use and benefit of the contracting parties, as defined and set forth in this agreement. It is agreed that the United Mine Workers of America is recognized herein as the exclusive bargaining agency representing the employees of the parties of the first part. It is further agreed that as a condition of employment all employees shall be, or become, members of the United Mine Workers of America, except in those exempted classifications of employment as hereinafter provided in this agreement. This provision does not change the rules or practices of the industry pertaining to management. The Mine Workers intend no intrusion upon the rights of management as heretofore practiced and understood. It is the intent and purpose of the parties hereto that this agreement will promote and improve industrial economic relationship in the bituminous coal industry and to set forth herein the basic agreements covering rates of pay, hours of work and conditions of employment to be observed between the parties, and shall cover the employment of persons employed in the bituminous coal mines covered by this agreement during such time as such persons are able and willing to work.

Exemptions Under This Agreement

It is the intention of this agreement to reserve to management and except from this agreement an adequate force of supervisory employees to effectively conduct the safe and efficient operation of the mines and at the same time, to provide against the abuse of such exemptions by excepting more such employees than are reasonably required for that purpose.

Coal inspectors and weigh bosses at mines where men are paid by the ton, watchmen, clerks, engineering and technical forces of the operator, working at or from a district or local mine office, are exempt from this agreement.

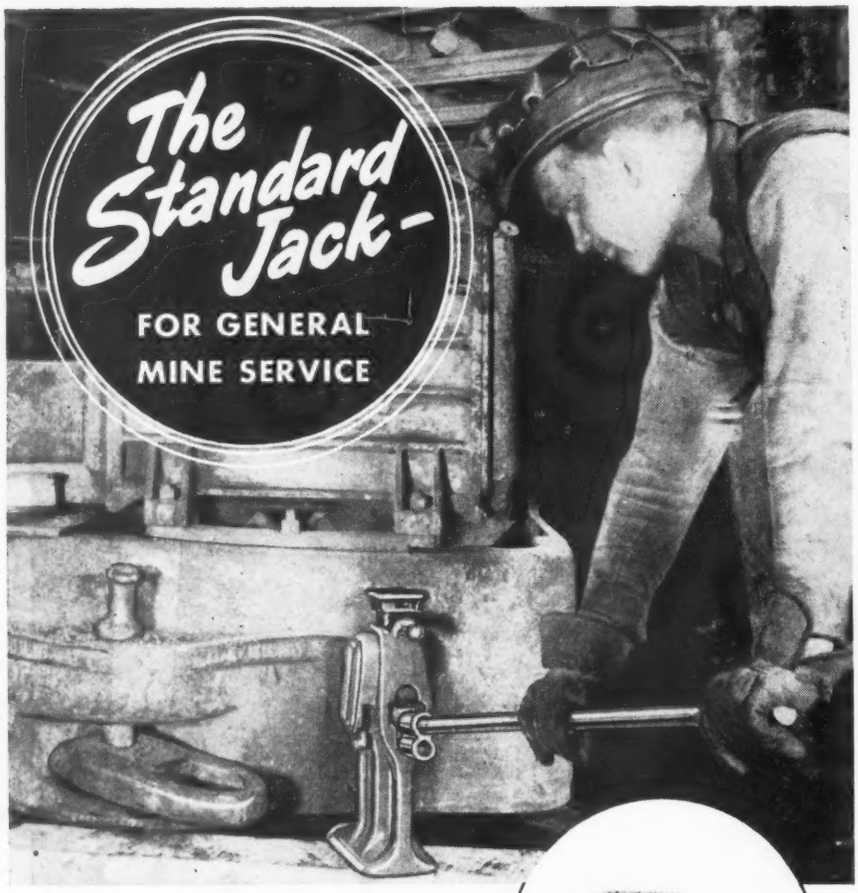
● BUILT BY GOODMAN MFG. CO.

Tonnage Delivered

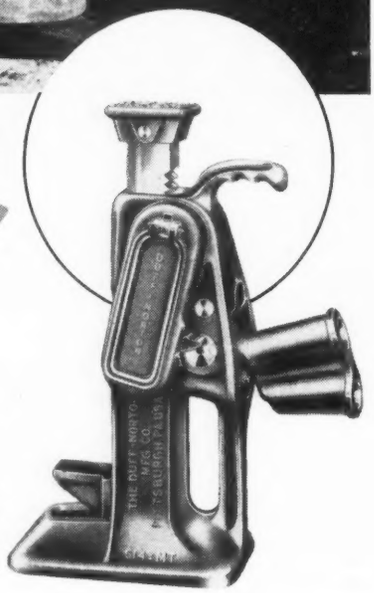
Increases with SKF-equipped Loaders!

Keeping coal on the move is an important job these days. Steel mills need it. So do thousands of homes and industrial plants. Its by-products are required for hundreds of uses. And many of the machines responsible for moving it have one thing in common with this Track Type Coal Loader: Their vital moving parts depend upon SKF Bearings. On this loader, SKF Spherical Roller Bearings are used on the front conveyor shaft and on the drive shaft in the main transmission. These are locations where rolling alignment, equalized load distribution, full load carrying capacity and dependable bearing performance pay big dividends continuously. SKF-equipped machines always play an outstanding part in production. 6295

SKF INDUSTRIES, INC.
Front St. & Erie Ave., Philadelphia 32, Pa.



DUFF-NORTON'S
5 TON
AUTOMATIC
LOWERING JACK



When it comes to automatic lifting, lowering, and bracing of mine cars, monitor cars, coal loaders, cutters and other coal hauling and dumping equipment, Duff-Norton's 5 ton Automatic Lowering Jack has been a standard tool for many years. Load is instantly engaged by simple adjustment of foot lift to height required—no wasted motion—no lost jacking time. This jack is unexcelled for general mine service.

Available in 14, 16, and 21 inch heights for thin, medium, and thick seams. Write today for your copy of Bulletin 203-A and for our proposal on your jack requirements.

DUFF-NORTON JACKS
STRENGTH, SAFETY, DURABILITY
ESTABLISHED 1883

THE DUFF-NORTON MANUFACTURING CO.
PITTSBURGH 30, PENNSYLVANIA
There is a Distributor Near You

All other employees working in or about the mines shall be included in this agreement except essential supervisors in fact such as: mine foremen, assistant mine foremen who, in the usual performance of their duties, may make examinations for gas as prescribed by law, and such other supervisors as are in charge of any class of labor inside or outside of the mines and who perform no production work.

The union will not seek to organize or ask recognition for such excepted supervisory employees during the life of this contract.

The operators shall not use this provision to exempt from the provisions of this agreement as supervisors, more men than are necessary for the safe and efficient operation of the mine, taking into consideration the area covered by the workings, roof conditions, drainage conditions, explosion hazards, and the ability of supervisors, due to thickness of the seam, to make the essential number of visits to the working faces as required by law and safety regulations.

Disputes arising under this section shall be referred to a Joint Board of Review consisting of two representatives of the union and two representatives of the operators whose decision shall be final and binding on the parties.

Mine Safety Program

(a) Mine Safety Code—The Federal Mine Safety Code for bituminous coal and lignite mines of the United States, adopted pursuant to an agreement dated May 29, 1946, between the Secretary of the Interior and the president of the United Mine Workers of America and promulgated July 24, 1946, is hereby adopted and incorporated by reference in this contract as a code for health and safety in bituminous and lignite mines of the parties of the first part, with the following exceptions and alterations:

(1) The opening paragraph beginning with the words "pursuant to" and ending with the words "Executive Order" is stricken out.

(2) The words "Coal Mines Administrator" are stricken out wherever they appear.

(3) Sections 5(a) and 5(b) of Article XII and all of Article XIV are stricken out.

(4) References in the Code to its effective date shall be deemed to refer to the effective date of this contract.

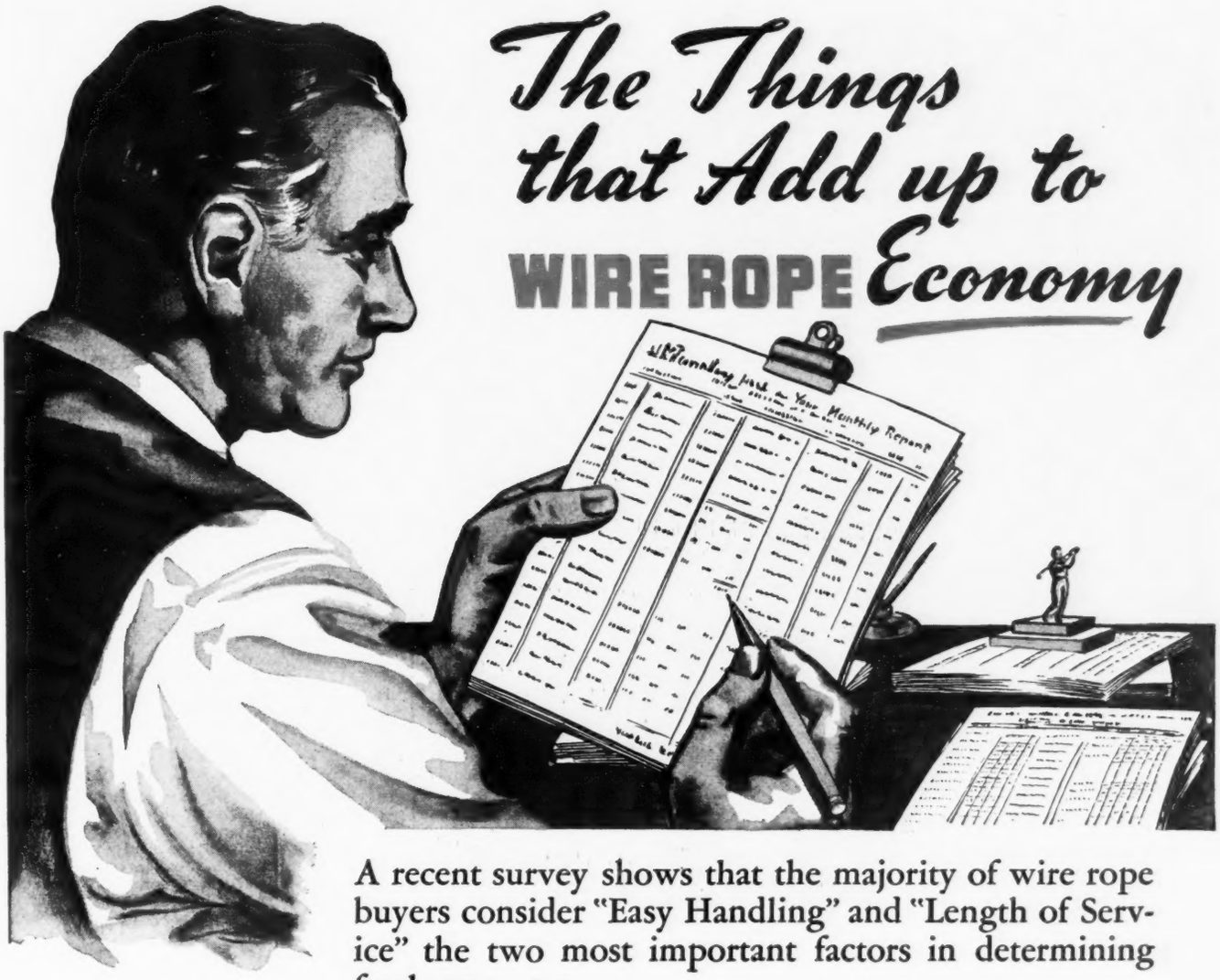
(b) Enforcement — (1) Reports of the Federal Coal Mines Inspectors:—Wherever inspectors of the Federal Bureau of Mines, in making their inspections in accordance with authority as provided in Public Law 49, 79th Congress, find that there are violations of this Code and make recommendations for the elimination of such non-compliance, the Operators shall promptly comply with such recommendations, except as modified in paragraph two of this subdivision (b).

(2) Whenever either party to the contract feels that compliance with the recommendations of the federal mine inspectors as provided above would cause irreparable damage or great injustice, they may appeal such recommendation to the Joint Board of Review as hereinafter provided.

(c) Review and Revision—In order to carry out the intent and purposes of the agreement affecting the Mine Safety Code, it is agreed that from time to time joint consultations shall be had with the U. S. Bureau of Mines looking toward review and appropriate revision of the Mine Safety Code.

(d) Joint Industry Safety Committee—There is hereby established under this agreement a Joint Industry Safety Committee composed of four members, two of whom will be appointed by the Mine Workers and two of whom will

The Things that Add up to WIRE ROPE *Economy*



A recent survey shows that the majority of wire rope buyers consider "Easy Handling" and "Length of Service" the two most important factors in determining final rope cost.

And more and more wire rope users are finding, by actual experience, that they can depend on Preformed "HERCULES" (Red-Strand) Wire Rope for these two top-ranking features. As it is available in a wide range of constructions – both Round Strand and Flattened Strand – they have *also* found that in "HERCULES" there is a *right rope* for any heavy duty purpose.

If you have not tried Preformed "HERCULES" (Red-Strand) Wire Rope you, too, would like its easy handling, smooth spooling and long life. Give it a chance to *prove* its money saving ability! We invite your inquiries.

"HERCULES"

REG. U.S. PAT. OFF.

RED-STRAND WIRE ROPE

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

ESTABLISHED 1857

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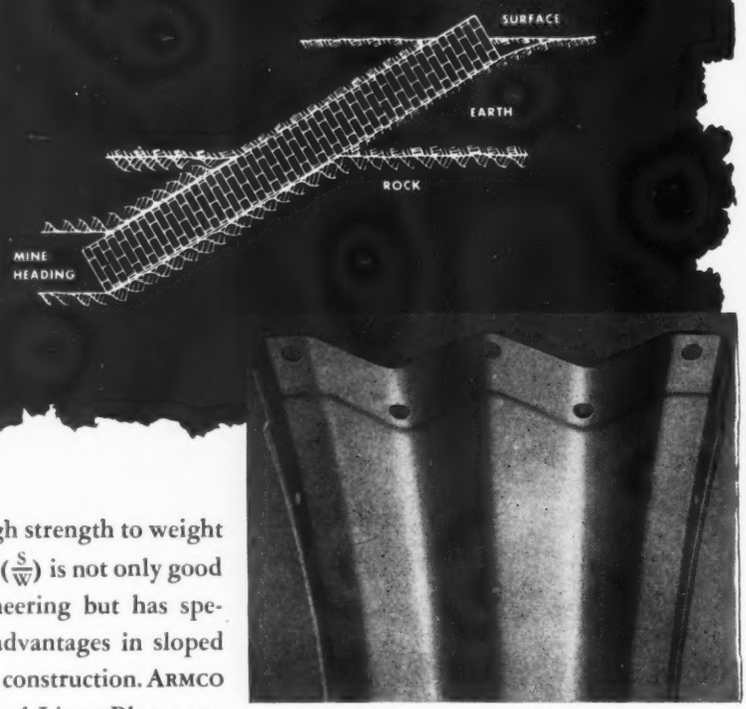
high $\frac{S}{W}$ = good tunneling



A high strength to weight ratio ($\frac{S}{W}$) is not only good engineering but has special advantages in sloped entry construction. ARMCO Tunnel Liner Plates are designed for utmost strength with the least possible weight.

This means that one unskilled workman can carry, hold and bolt into place an Armco liner section. Only a structural wrench is needed. Labor costs are low and the job goes fast. Less bulk also means less excavation, and storage requirements are smaller. You buy no excess metal, and this keeps job costs down.

You'll find ARMCO Liner Plates the simplest, most inexpensive way you ever saw to construct better passageways from ground surface to working levels. They provide worth while durability and safety from fire hazards. Use these plates for sloped entries, air shafts, escapeways, substations, overcasts and wherever else you need the protection and other advantages of a steel liner. Write for data. Armco Drainage & Metal Products, Inc., 415 Curtis St., Middletown, O.

ARMCO TUNNEL LINER PLATES

ARMCO

be appointed by the Operators, whose duty it shall be to (1) arbitrate any appeal which is filed with it by any operator or any mine worker who feels that any reported violation of the Code and recommendation of compliance by a federal coal-mine inspector has not been justly reported or that the action required of him to correct the violation would subject him to irreparable damage or great injustice; and (2) to consult with the U. S. Bureau of Mines in accordance with the provisions of Section (c) above.

(e) Mine Safety Committee—At each mine there shall be a Mine Safety Committee selected by the local union. The committee members while engaged in the performance of their duties shall be paid by the union, but shall be deemed to be acting within the scope of their employment in the mine within the meaning of the workmen's compensation law of the state where such duties are performed.

The Mine Safety Committee may inspect any mine development or equipment used in producing coal. If the committee believes conditions found endanger the life and bodies of the mine workers, it shall report its findings and recommendations to the management. In these special instances where the committee believes an immediate danger exists and the committee recommends that the management remove all mine workers from the unsafe area, the operator is required to follow the recommendation of the committee.

If the safety committee in closing down an unsafe area acts arbitrarily and capriciously, members of such committee may be removed from the committee. Grievances that may arise as a result of a removal of a member of the safety committee under this section shall be handled in accordance with the provisions providing for settlement of disputes.

The safety committee and operators shall maintain such records concerning inspections, findings, recommendations, and actions relating to this provision of the agreement as may be required, and copies of all reports made by the safety committee shall be filed with the operators.

(f) The International Union, United Mine Workers of America may designate memorial periods provided it shall give proper notice to each district.

Workmen's Compensation and Occupational Diseases

Each operator who is a party to this agreement will provide the protection and coverage of the benefits under workmen's compensation and occupational disease laws, whether compulsory or elective, existing in the states in which the respective employees are employed. Refusal of any operator to carry out this direction shall be deemed a violation of this agreement. Notice of compliance with this section shall be posted at the mine.

Welfare and Retirement Fund

A. It is hereby stipulated and agreed by the contracting parties hereto that there is hereby created a fund to be designated and known as the "United Mine Workers of America Welfare and Retirement Fund." During the life of this agreement, there shall be paid into such fund by each operator signatory hereto the sum of ten cents (10c.) per ton of two thousand (2,000) lbs. on each ton of coal produced for use or for sale. Such fund shall have its place of business in Washington, District of Columbia, and it shall be operated by a Board of Trustees, one of whom shall be appointed as a representative of the employers, one of whom shall be appointed as a representative of the United Mine Workers of America and one of whom shall be a neutral party selected by the other two. In the event

MANHATTAN'S *Homocord* CONVEYOR BELTS trough easier

- cushioned...
- tough...
- flexible...
- mildew-proof

"Rippling Muscles" CONSTRUCTION

If a conveyor belt doesn't "relax" in the troughing idlers it undergoes internal stresses that shorten its life. Manhattan engineers recognized this and set out to develop an entirely new "strength member" construction that would take the constant "two-way" flexing—crosswise in the troughing idlers and lengthwise on the pulleys.

Thus, they developed HOMOCORD specially and only for conveyor belting service. HOMOCORD's "rippling muscles" construction works like the muscles in a wrestler's back. It flexes easily and constantly without tiring . . . and it takes the shock of pounding pay loads for a well-cushioned "ride."

Make your own test like that shown above. Compare HOMOCORD with any other heavy duty belt. When you see how much easier HOMOCORD "troughs" you will be convinced how much better it can take the beating of heavy mine hauls. It's everything you want . . . cushioned . . . tough . . . flexible . . . mildew-proof. Ask a Manhattan Man to show you a sample.

When planning heavy-duty, long-lift operations, ask about the new Ray-Man Belt: first Rayon Strength Member Conveyor Belt with super-strength

A COMPLETE LINE FOR MINES

The Manhattan line of hose, belting and special rubber products for mines is thoroughly engineered to the latest advances in mining efficiency, safety and economy. A leader in the mining fields for 54 years, Manhattan is always your best investment.

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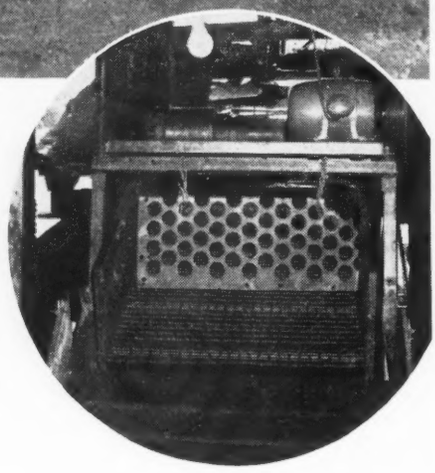
RAYBESTOS-MANHATTAN INC.

Keep Ahead with Manhattan

MANHATTAN RUBBER DIVISION **PASSAIC, NEW JERSEY**



"Wouldn't Buy Any Other Type"

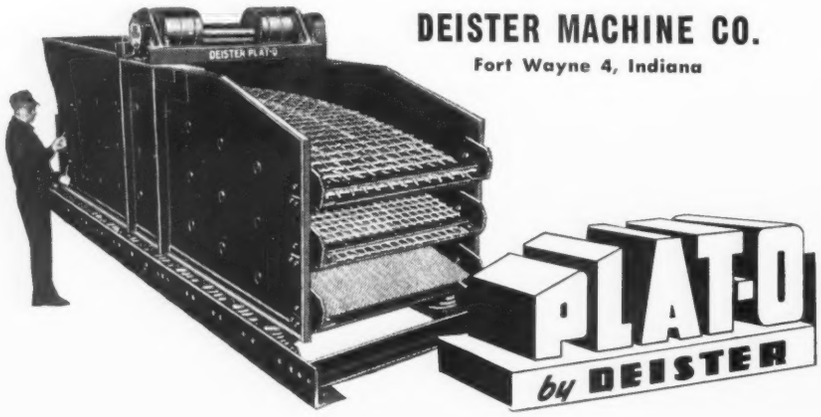
. . . Says Veteran Coal Mine Operator

A "real classifier" is the way B. T. Chapman, coal mine owner of Collinsville, Illinois, describes his Plat-O Vibrating Screen. "I wouldn't buy any other type, I like its principle of operation and it will do its job under any condition."

The 4' x 10' triple-deck Plat-O, installed at the Chapman mine over a year ago, screens all of the coal mined in a seven-hour day. "It could easily handle 700 tons a day," Mr. Chapman states, "but at present it actually is required to screen 350 to 500 tons." His Plat-O produces four sizes of coal, 6-inch lump, 2 x 6 egg, 1 x 3½ nut, and 1½ x 0 screen.

Mr. Chapman is just one of the many satisfied operators who have found Plat-O performance profitable. Write to the Deister Machine Company for information on how Plat-O Vibrating Screens can improve your operations.

DEISTER MACHINE CO.
Fort Wayne 4, Indiana



of resignation, death, inability or unwillingness to serve of the trustee appointed by the Operators or the trustee appointed by the United Mine Workers of America, the Operators shall appoint the successor of the trustee originally appointed by them and the United Mine Workers of America shall appoint the successor of the trustee originally appointed by it.

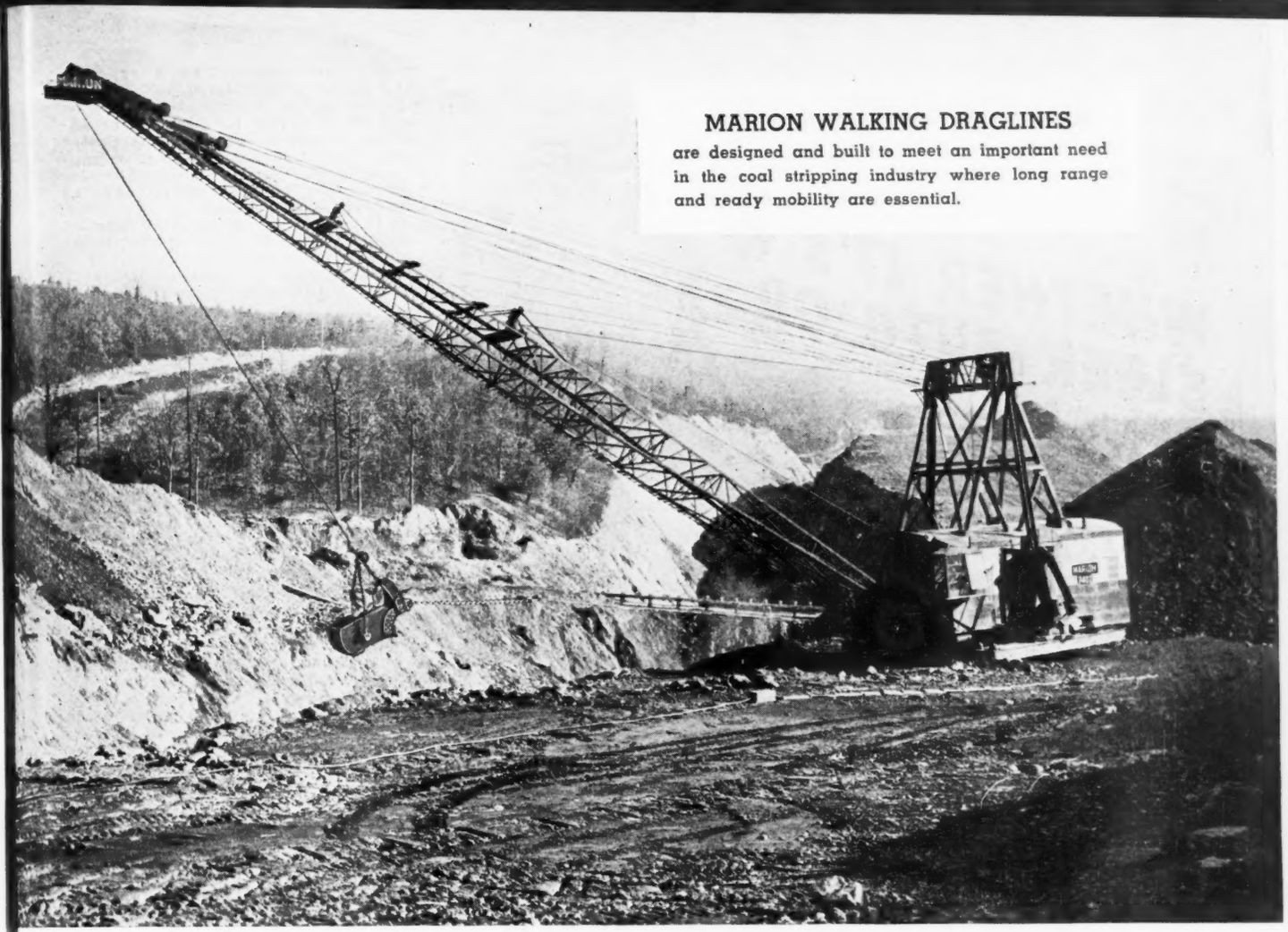
The Operators signatory hereto do hereby appoint Ezra Van Horn of Cleveland, Ohio, as their representative on said Board of Trustees. The United Mine Workers of America do hereby appoint John L. Lewis of Washington, D. C. as its representative on said Board of Trustees. It is further stipulated and agreed by the joint contracting parties that the aforesaid two trustees shall with all dispatch designate and name a third and neutral trustee. Said three trustees so named and designated shall constitute the Board of Trustees to administer the fund herein created.

In the event of a deadlock on the designation or agreement as to the neutral trustee, or any future neutral trustee, an impartial umpire shall be selected either by agreement of the two trustees, representatives of the contracting parties hereto, or by petition by either of the contracting parties hereto to the United States District Court for the District of Columbia for the appointment of such an impartial umpire, all as made and provided in Section 302 (c) of the "Labor-Management Relations Act, 1947."

It is agreed by the contracting parties hereto that the trustees herein provided for shall serve for the duration of this contract and as long thereafter as the proper continuation and administration of said trust shall require.

It is agreed that this fund is an irrevocable trust created pursuant to Section 302 (c) of the Labor-Management Relations Act, 1947," and shall endure as long as the purposes for its creation shall exist. Said purposes shall be to make payments from principal or income or both, of (1) benefits to employees of said Operators, their families and dependents for medical or hospital care, pensions on retirement or death of employees, compensation for injuries or illness resulting from occupational activity or insurance to provide any of the foregoing, or life insurance, disability and sickness insurance or accident insurance; (2) benefits with respect to wage loss not otherwise compensated for at all or adequately by tax supported agencies created by federal or state law; (3) benefits on account of sickness, temporary disability, permanent disability, death or retirement; (4) benefits for any and all other purposes which may be specified, provided for or permitted in Section 302 (c) of the "Labor-Management Relations Act, 1947," as agreed upon from time to time by the trustees including the making of any or all of the foregoing benefits applicable to the individual members of the United Mine Workers of America and their dependents; and (5) benefits for all other related welfare purposes as may be determined by the trustees within the scope of the provisions of the aforesaid "Labor-Management Relations Act, 1947." Subject to the stated purposes of this fund, the trustees shall have full authority, within the terms and provisions of the "Labor-Management Relations Act, 1947," and other applicable law, with respect to questions of coverage and eligibility, priorities among classes of benefits, amounts of benefits, methods of providing or arranging for provisions for benefits, investment of trust funds, and all other related matters.

The aforesaid trustees shall designate a portion (which may be changed from time to time) of the payments herein provided, based upon proper ac-



MARION WALKING DRAGLINES
are designed and built to meet an important need in the coal stripping industry where long range and ready mobility are essential.

IMPORTANT STEPS TO BIGGER YARDAGE IN COAL STRIPPING

MARION WALKING DRAGLINES are solving new material handling problems daily in the coal stripping industry. Much wider benches of coal can be uncovered at lower cost because the long range operation of MARION WALKERS stacks overburden at far greater distances than any other type of machine. Rich, coal-bearing properties that are not workable with conventional methods used in coal stripping need not be by-passed with a MARION WALKER on the job. The exclusive MARION walking principle plus many other features of design provides the machine with an unusual degree of flexibility of movement that makes it perfect for working on top of unfavorable or swampy ground.

MARION WALKING DRAGLINES are built in the following sizes:

Type 7200.....	5 cu. yds.....	135′ boom
Type 7200.....	7 cu. yds.....	100′ boom
Type 7400.....	10 cu. yds.....	200′ boom
Type 7400.....	12 cu. yds.....	175′ boom
Type 7800.....	30 cu. yds.....	200′ boom

What is your coal stripping problem?

MARION

POWER SHOVEL COMPANY

MARION, OHIO, U. S. A.

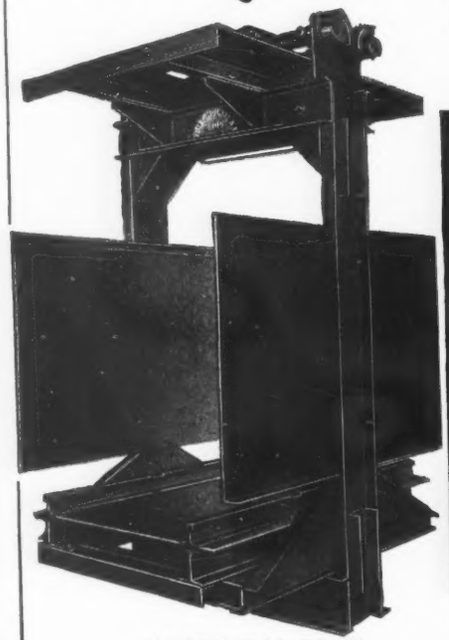
Offices and Warehouses in all Principal Cities

WHETHER IT'S A SLEEK AUTO OR A HOLMES CAGE IT TAKES GOOD DESIGNING!

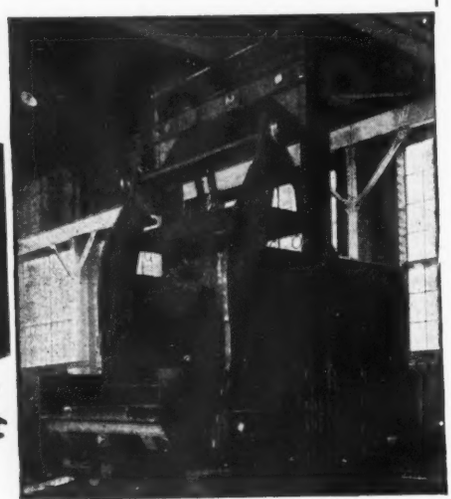
In HOLMES design all operating mechanisms have been simplified as far as possible, both to eliminate dead weight and reduce the percentage of delay from failure of some gadget to function properly. All operating parts are arranged for quick change with ordinary tools.

SELF DUMPING

The car lock requires no special attachments on cars. It is also adapted for use with any of the standard automatic cagers.



PLATFORM CAGE



Over Turning Type Cage for Use with Solid End Cars

ROBT. HOLMES & BROS., INC.

DANVILLE, ILLINOIS

tuarial computations, as a separate fund to be administered by the said trustees herein described and to be used for providing for pensions or annuities for the members of the United Mine Workers of America or their families or dependents and such other persons as may be properly included as beneficiaries thereunder.

It is further agreed that the detailed basis upon which payments from the fund will be made shall be resolved in writing by the aforesaid trustees at their initial meeting, or at the earliest practicable date that may by them thereafter be agreed upon.

Title to all the moneys paid into said fund shall be vested in and remain exclusively in the trustees of the fund, and it is the intention of the parties hereto that said fund shall constitute an irrevocable trust and that no benefits or moneys payable from this fund shall be subject in any manner to anticipation, alienation, sale, transfer, assignment, pledge, encumbrance or charge, and any attempt so to anticipate, alienate, sell, transfer, assign, pledge, encumber or charge the same shall be void. The moneys to be paid into said fund shall not constitute or be deemed wages due to the individual mine worker, nor shall said moneys in any manner be liable for or subject to the debts, contracts, liabilities or torts of the parties entitled to such money, i.e., the beneficiaries of said trust under the terms of this Agreement.

The obligation to make payments to the "United Mine Workers of America Welfare and Retirement Fund" under this contract shall become effective on July 1, 1947, and the first actual payments are to be made on August 20, 1947, and thereafter continuously on the 20th day of each succeeding calendar month covering the production of all coal for use or sale during the preceding month.

It is stipulated and agreed by the contracting parties hereto that the trustee designated by the United Mine Workers of America shall be the chairman of the trustees of the fund provided for in this Agreement.

It shall be the duty of the Operators signatory hereto, and each of them, to keep said payments due said fund, as hereinabove described and provided for, current and to furnish to the United Mine Workers of America and to the trustees hereinabove designated a monthly statement showing the full amount due hereunder for all coal produced for use or for sale from each of the several individual mines owned or operated by the said Operators signatory hereto. Payments to said fund shall be made by check payable to "United Mine Workers of America Welfare and Retirement Fund" and shall be delivered or mailed to the office of said fund located at 907 Fifteenth Street, N. W., Washington, D. C., or as otherwise designated by the trustees.

It is stipulated and agreed by the contracting parties hereto that an annual audit of the fund hereinabove described shall be made by competent authorities to be designated by the trustees of said fund. A statement of the results of such audit shall be made available for inspection of interested persons at the principal office of the trust fund and at such other places as may be designated by the trustees.

Failure of any Operator signatory to make full and prompt payments to the "United Mine Workers of America Welfare and Retirement Fund" in the manner and on the dates herein provided shall, at the option of the United Mine Workers of America, be deemed a violation of this agreement. This obligation of each Operator signatory hereto, which is several and not joint, to so pay such sums shall be a direct and continuing obligation of said Operator during the life of this agreement and it shall be deemed a violation of this agreement if any mine to which this

For the *Toughest* Service on Powered Wheels

The GENERAL LCM

for *Logging* *Construction* *Mining*

New Angle Pulling Power
More Rubber • Greater Traction

Squeegee Power Cleats • Ejection Action

Snag-Resistant Tread and Sidewall
Heavy Shock-Absorber Plies

Buttressed Highway Rib • Reinforced, Extra Heavy Beads

Natural Rubber Impact Cushion
Deeper, Cool-Running Shoulders

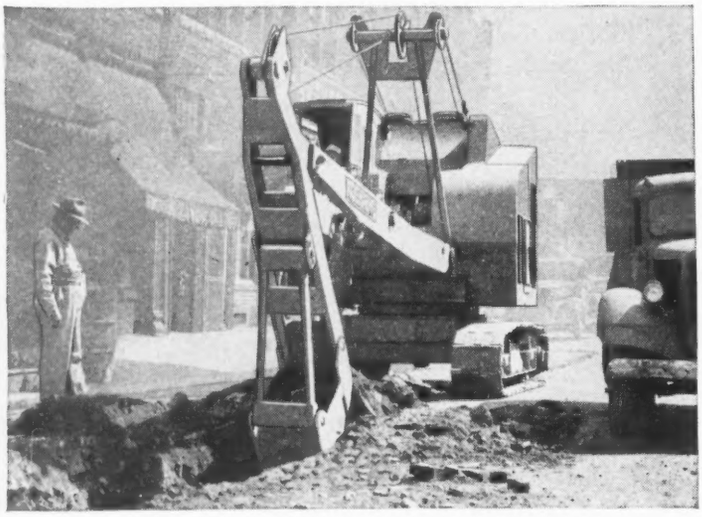
The GENERAL L.C.M.

THE GENERAL TIRE & RUBBER CO. • AKRON, OHIO

KOEHRING HEAVY-DUTY HALF YARD

2-in-1 SHOVEL BOOM Cuts Cost 30% When You Add Backhoe to Shovel

INDEPENDENT TRACTION Steps Up Crane, Clamshell, Shovel Output



Husky 2-in-1 Shovel Boom meets both shovel and backhoe requirements, makes trench dressing easy. Boom does not "weave."

Because the 2-in-1 Shovel Boom is standard equipment on the Koehring 205 shovel, backhoe job profits can be yours with only small additional investment. Same boom serves both attachments. Front end equipment to convert Koehring 205 shovel to backhoe costs approximately 30% less than with machines using conventional backhoe attachment with special boom. You get a huskier shovel boom PLUS a rigid backhoe boom that never weaves. Backhoe dipper never turns away from cut. Backhoe sidecutters can be used to full advantage in widening trench or dressing side of basement excavation. Because 205 does complete job, hand finishing is unnecessary. Low investment cost on backhoe attachment increases profits on both shovel and backhoe work.

Independent travel — travel while you swing, hoist boom or load — makes travel-time productive time with any front end.

Swing and Hoist While You Travel

With the Koehring 205, you don't lose productive time while getting ready or worry about boom clearance when you turn. You can swing, hoist load, or change boom angle as you travel. Or you can carry on all four operations — travel, swing, raise or lower load and operate boom hoist — all at the same time. You never stop work to maneuver the turntable into a precise, hard-to-reach travel or steering position. With the Koehring 205, you steer and travel with turntable in any position. This is a valuable time saver in tight quarters. You can often work as you travel. Because you handle several operations simultaneously, move-up time is no longer unproductive. With any front end, you get more work done every shift.

KOEHRING HEAVY DUTY

KOEHRING COMPANY
Milwaukee 10, Wisconsin

KOEHRING 205

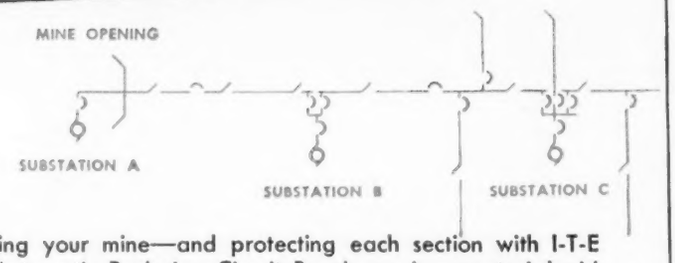
On Koehring 205 shovel, chain-driven double-cable crowd gets extra power to the dipper for tough digging jobs. Low center of gravity, well in back of center of rotation, steps up digging stability.

KOEHRING for hauling and paving

Koehring Dumptor has no body hoist, dumps in 1 second in any weather. Seconds saved add up to extra yardage every day.

Koehring *twinbatch* paver gets highway jobs through on schedule, in the money. Time-tested, job-tested, Heavy-duty construction.

SECTIONALIZATION For Reduced Costs



Sectionalizing your mine—and protecting each section with I-T-E Type KSC Automatic Reclosing Circuit Breakers—is a material aid to "good power". Good power minimizes number of machines out of service, cuts down parts and labor used in maintenance, and permits machines to produce at normal rates. All these factors mean higher efficiency—and reduced service costs.

Here's how sectionalizing helps achieve good power. Look at the typical application above.

For overcurrent protection, an I-T-E Type KSC is installed at each main branch circuit. When an electrical fault occurs, the KSC opens and isolates the faulted branch from the system. Thus, trouble cannot affect equipment in other branches or penalize the remainder of the circuits.

I-T-E Type KSC Automatic Reclosing Circuit Breakers protect your mine in many other ways. Find out how by contacting the I-T-E Mining Specialist in your neighborhood. He will be glad to make an application analysis of your mine electrical distribution system. Use him—at no obligation. I-T-E Circuit Breaker Company, 19th and Hamilton Streets, Philadelphia 30, Pa.

Be Wise SECTIONALIZE

Send for Bulletin 4611 and get complete details on I-T-E Automatic Reclosing Circuit Breakers

I-T-E Circuit Breaker Company

19TH AND HAMILTON STREETS, PHILADELPHIA 30, PA.

(3RD OF A SERIES ON RECOMMENDED SECTIONALIZING PRACTICE USING THE KSC)

I-T-E SECTIONALIZING Switchgear

agreement is applicable shall be sold, leased, sub-leased, assigned, or otherwise disposed of for the purpose of avoiding the obligation hereunder.

Action which may be required hereunder by the Operators for the appointment of a successor trustee representing them, or which may be required in connection with any other matter hereunder, may be taken by those Operators who at the time are parties hereto, and authorization, approval, or ratification of Operators representing fifty-one per cent (51%) or more of the coal produced for use or sale during the calendar year previous to that in which the action is taken shall be sufficient and shall bind all Operators.

B. It is hereby stipulated and agreed by the contracting parties with respect to the fund created by Section 4 (a) of the National Bituminous Coal Wage Agreement dated May 29, 1946 (commonly known as the Krug-Lewis Agreement), as follows:

(1) The Operators signatory hereto agree to make payments into said fund on or before July 15, 1947, on account of all coal produced for use or sale up to and including June 30, 1947, with respect to which payment has not heretofore been made, such payments to be on the basis heretofore made by said Operators under the provisions of the Krug-Lewis Agreement.

(2) The Operators signatory hereto renounce and forever release any and all claim to or interest in payments made into said fund.

(3) The trustees appointed pursuant to this agreement are hereby authorized and directed to accept into the new trust fund hereby created and to devote for the purposes hereinabove specified and enumerated, any and all trust funds remaining unexpended or unobligated in said trust fund so created by Section 4 (a) of the Krug-Lewis Agreement.

(4) The parties hereto agree that the best interests of the beneficiaries of said trust fund would be served by having all unexpended or unobligated funds therein transferred as above provided, and agree that the trustees thereof should transfer such funds to the new trust fund created by this agreement.

C. It is stipulated and agreed by and between the contracting parties that the moneys collected under Section 10 of the Krug-Lewis Agreement for the benefit of the fund designated as "Medical and Hospital Fund" as provided for in Section 4 (b) of said Krug-Lewis Agreement shall be transferred to the trustees of the "United Mine Workers of America Welfare and Retirement Fund" as established by this agreement and said moneys shall be coordinated into the aforesaid fund and be made subject to the stated purposes hereinabove set out.

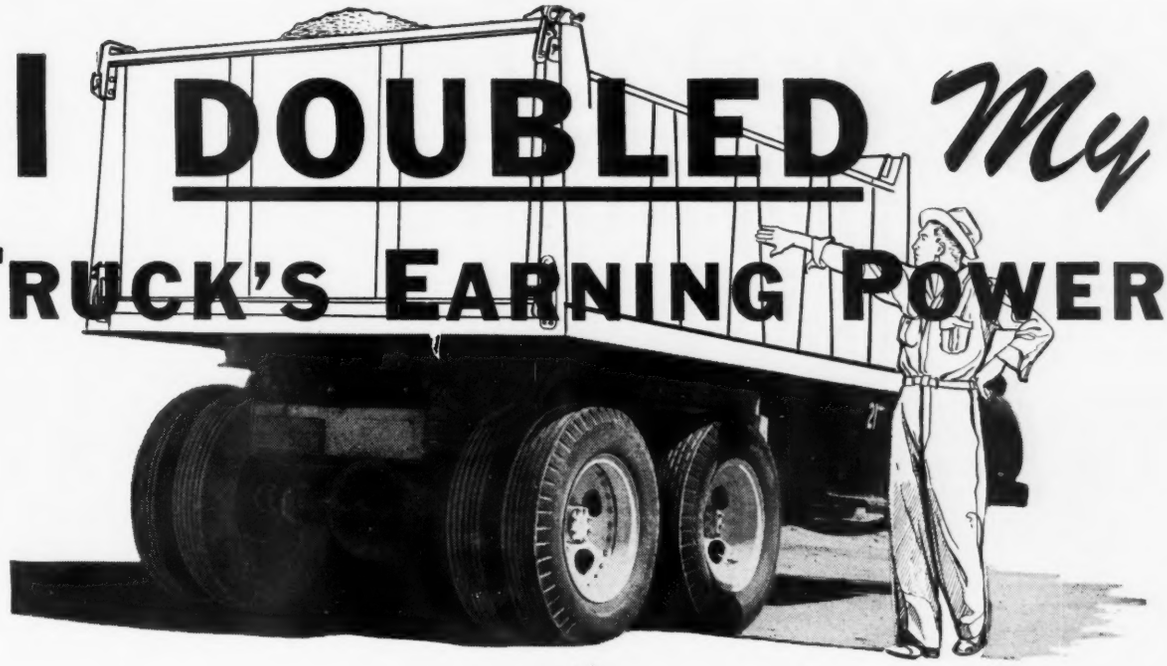
It is stipulated, understood and agreed by the contracting parties hereto that present practices with respect to wage deductions and their use for provision of medical, hospital and related services shall continue during the term of this contract or until such earlier date or dates as may be agreed upon by the United Mine Workers of America and any Operator signatory hereto.

D. It is the intent and purpose of the contracting parties hereto that full cooperation shall by each of them be given to each other, the trustees named under this section and to all affected Mine Workers to the eventual coordination and development of policies and working agreements necessary or advisable for the effective operation of this fund.

Wages and Hours

1. (a) For all inside employees a work day of eight hours from portal to portal is established, including a staggered thirty-minutes for lunch,

I DOUBLED My TRUCK'S EARNING POWER!



with a

DETROIT AUTOMOTIVE

THORNTON DRIVE

"Yes, sir! I really hit a gold mine when I put a Thornton 4-Rear Wheel Drive on my medium truck! That Thornton Drive has made my medium truck into a heavy hauler—a powerful, high capacity, rugged 6-wheeler. It has doubled my profits by doubling my payloads and increasing my performance by nearly 100%—yet I still have the operating economy and advantages of a medium truck!

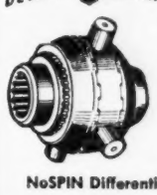
"Figure it out yourself. My medium truck had a G.V.W. of 14,000 pounds. When equipped with a Thornton Drive, that same truck has a gross of 30,000 pounds. This additional equipment increased my body and chassis weight by only 78%. Therefore, the payload was more than doubled!

"And performance? My Thornton Drive, using 3 NoSPIN Differentials,* gives me *two* driving axles, *four* driving wheels—each with powerful, positive, independent drive. With that increased traction plus the Thornton Drive's rugged walking beam springs, I can *get out* of mighty tough places—do jobs I'd never attempt otherwise. My performance is 100% better both on the road and on those rugged off-the-road jobs.

"Yes, sir—any trucker can hit the profit jackpot—*double his earning power*—by converting his medium equipment to heavy capacity, high performance trucks with Thornton 4-Wheel Drive!"

**Regular equipment in Thornton Gear Case. Optional equipment in driving axles.*

DETROIT AUTOMOTIVE **NoSPIN Saves Profits!**



NoSPIN is standard equipment in the 2-speed gear case of the Thornton Drive, providing positive drive to both rear axles and eliminating axle fight over any terrain.

When NoSPINs are also used in both driving axles (optional), positive drive is provided to *all four* rear wheels.

NoSPIN Differentials are also available for single axle trucks.

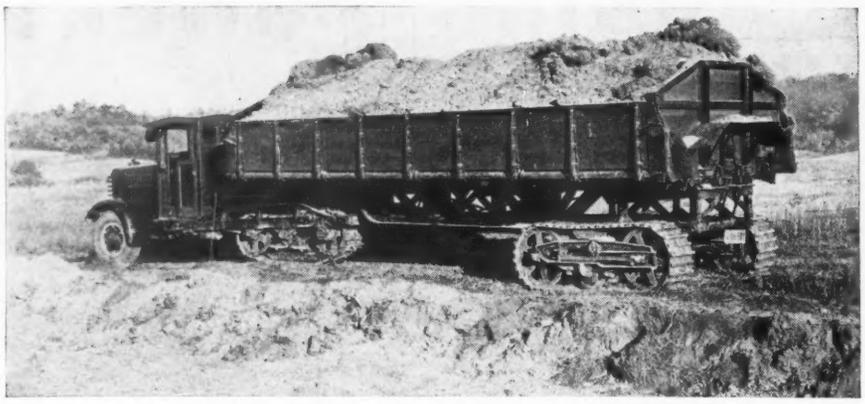
DETROIT AUTOMOTIVE
PRODUCTS CORPORATION

(formerly Thornton Tandem Co.)

8701 Grinnell Avenue • Detroit 13, Michigan

***Distributed in U. S. A. by* TRUCKSTELL DISTRIBUTORS**

Cut disposal Costs WITH LINNS



Track semi-trailer, capacity 25 to 50 tons; two-way side tipping with dumping angle of 50°; heavy duty underbody hoists and automatic down-fold side gates.

- Because of their large capacity, LINN Haftraks handle more tons of refuse per man day with fewer trips to the dump. Built to take the roughest kind of service, they require much less time out for repairs than any other type of haulage equipment.

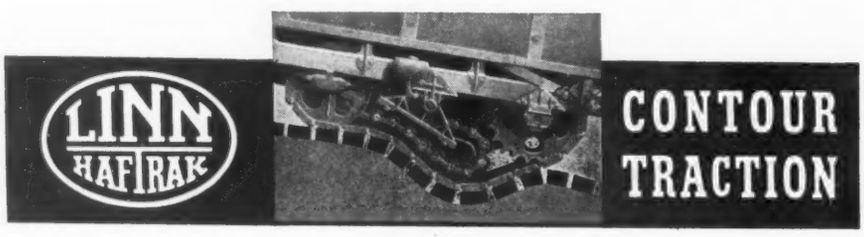
- Because of their traction units and ample power, LINNS carry the load—every day—regardless of footing or grade. The traction unit is flexible, not rigid, and bites in to give maximum traction over rocks, mud, ice, or burning bone that would ruin tires.

- Because they are available with capacities from 5 to 50 tons, with body styles for all types of work, or for mounting special equipment, there's a LINN for every mining need. For specifications, write to our General Sales Office, 250 West 57th Street, New York 19, N. Y.

THE LINN MANUFACTURING CORPORATION

MORRIS, N. Y.

Manufacturers of Haftraks for Over 30 Years



and without any intermission or suspension of operation throughout the day. For inside day workers these eight hours shall be paid for at straight time rate. Overtime beyond eight hours per day and forty hours per week shall be paid for at time and one-half with no pyramiding of overtime. Straight time rates for inside day workers shall be the total daily normal shift earnings for eight hours divided by eight (8) hours.

(b) For all outside employees except those covered in paragraph (c) hereof (including all strip mine and coke oven employees), a work day of seven hours and fifteen minutes is established including a staggered thirty minutes for lunch, and without any intermission or suspension of operations throughout the day. These seven hours and fifteen minutes shall be paid for at straight time rate. Overtime beyond seven hours and fifteen minutes per day and thirty-six and one quarter hours per week shall be paid for at time and one-half with no pyramiding of overtime. Straight time earnings for outside day workers covered by this paragraph shall be the total daily normal shift earnings for seven hours and fifteen minutes divided by seven and one-quarter (7.25) hours.

(c) For all outside continuous employees who are engaged at power houses, substations and pumps operating continuously for twenty-four (24) hours daily, and hoisting engineers, a work day of eight hours is established, including a staggered thirty minutes for lunch and without any intermission or suspension of operations throughout the day. These eight hours shall be paid for at straight time rate. Overtime beyond eight hours per day and forty hours per week shall be paid for at time and one-half with no pyramiding of overtime. Straight time earnings for day workers covered by this paragraph shall be the total daily normal shift earnings for eight hours divided by eight (8) hours.

(d) All mine workers, whether employed by the month, day, or tonnage, yardage, deadwork or footage rate, shall receive $3.05 per day in addition to that provided for in the contract which expired March 31, 1946.

(e) Work performed on the sixth consecutive day is optional, but when performed shall be paid for at time and one-half or rate and one-half.

(f) Holidays, when worked, shall be paid for at time and one-half or rate and one-half. Holidays shall be computed in arriving at the sixth and seventh day in the week.

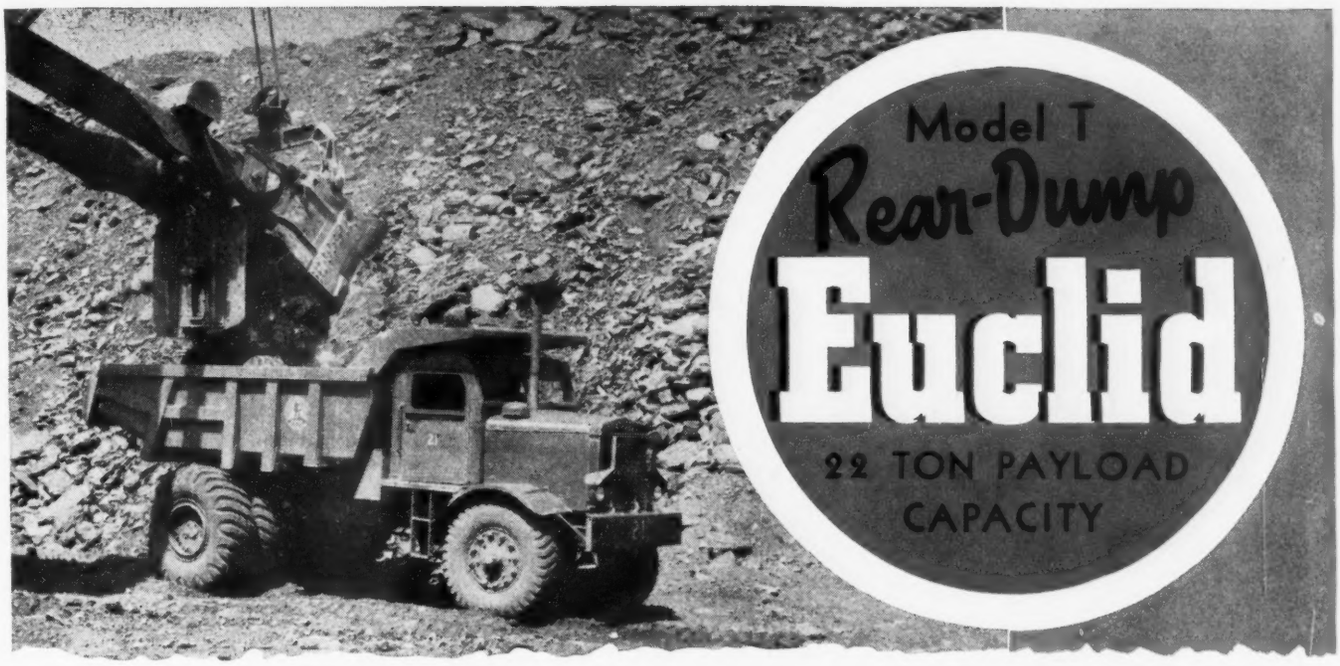
(g) Employees paid by the day or by the ton who start to work, that day shall be counted as a day's work in computing the sixth and seventh day in the week provided they do not leave their employment when work is available for them.

(h) Rockdusting shall be done at the expense of the coal operator.

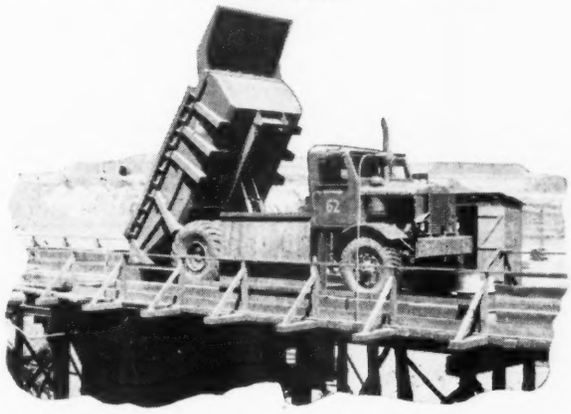
Vacation Payment

An annual vacation period shall be the rule of the industry. From Saturday June 26, 1948, to Monday, July 5, 1948, inclusive shall be a vacation period during which coal production shall cease. Day-men required to work during this period at coke plants and other necessarily continuous operations or on emergency or repair work shall have vacations of the same duration at other agreed periods.

All employees with a record of one year's standing (June 1, 1947, to May 31, 1948) shall receive as compensation for the above mentioned vacation period the sum of one hundred dollars ($100), with the following exception: employees who entered the armed services prior to March 31, 1947, and who return to their jobs from the armed services during the qualifying period shall receive the $100 vacation payment.



The Model T Rear-Dump Euclid has abundant power and speed for steep grades. Distribution of weight and large tires result in excellent traction and flotation.



Dumping 22 tons of iron ore into drive-over hopper on the Mesabi Range in Minnesota. Load is shed quickly because of smooth body interior and high dumping angle.

DESIGNED to work with large loading equipment, the Model T Euclid has extra large capacity and unusual power and speed for steep grades. Low loading height, large top area, fast hoist action, high dumping angle, exceptional maneuverability and traction, and high ratio of horsepower to weight . . . all of these Euclid features contribute to efficient performance.

This model has a struck measure capacity of 14.8 cu. yds. and payload capacity of 44,000 lbs. Powered by Diesel engine of 200 to 275 h.p. rating, top speed with capacity payload is 31.2 m.p.h. Hydraulic steering is standard equipment. The drive axle is full-floating and planetary type double-reduction, built for big loads, large engines, and heavy service.

Wherever extra capacity and power are required to move large yardages on difficult hauls, the Model T will do the job with speed and efficiency.

The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

CONTAINS performance charts showing how to select a slurry pump to insure maximum life of the wearing parts when pumping any one of three basic types of slurries each containing a different percentage of solids.

TELLS how the shell is interchangeable for right or left hand rotation . . . how the suction and discharge nozzles can be rotated around axis of pump to positions in any of the four quadrants, a total of 72 possible combinations.

SHOWS how the Type "R" has no internal studs or bolts . . . how the impeller is easily removed without disturbing piping . . . how the gland is under suction pressure only, quickly dismantled by removing four bolts . . .

DESCRIBES the ingenious design of the stuffing box and its minimized packing troubles . . .

SHOWS how the Type "R" is maintained *at very low cost* . . .

READ how its advanced design efficiently handles sludges in coal mines; coal washing and silt disposal; all types of mixtures containing abrasive solids, including ore concentrates, tailings, residue from filters and classifiers.

Write for the Type "R" BULLETIN TODAY! *It's Free!*

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Sales Offices in Principal Cities

MORRIS *Centrifugal Pumps*

All the terms and provisions of district agreements relating to vacation pay for sick and injured employees are carried forward to this agreement and payments are to be made in the sum as provided herein.

Pro rata payments for the months they are on the payroll shall be provided for those mine workers who are given employment during the qualifying period and those who leave their employment.

The vacation payment of the 1948 period shall be made on the last pay day occurring in the month of June of that year.

Failure of any Operator signatory hereto to make full and prompt payment of the amounts required hereby, in the manner and on the dates herein provided, shall, at the opinion of the United Mine Workers of America, be deemed a violation of this agreement. This obligation of each Operator signatory hereto, which is several and not joint, to so pay such sums, shall be a direct and continuing obligation of said Operator during the life of this agreement; and it shall be deemed a violation of this agreement if any mine, to which this agreement is applicable, shall be sold, leased, subleased, assigned, or otherwise disposed of for the purpose of avoiding the obligation hereunder.

Checkoff

The membership dues, including initiation fees, and assessments of the United Mine Workers of America and its various subdivisions, as authorized and approved by the International Union, United Mine Workers of America, shall be checked off the wages of the employees by the Operators covered by this contract and shall be remitted by the Operators to the properly designated officers of the Mine Workers for distribution to its various branches. Such remittances shall be accompanied by an itemized statement showing the name of each employee and the amount checked off for dues, initiation fees and assessments together with a list of employees for whom dues, initiation fees and assessments have not been collected.

In order that this section may become effective and operate within the limitations of the "Labor-Management Relations Act, 1947" the Mine Workers hereby agree to furnish, with all reasonable dispatch, to the respective Operators, and the Operators agree to aid, assist and cooperate in obtaining written assignments from each employee so employed. Upon the presentation to the Operators of such assignments in such reasonable form as time and circumstances, looking to the continuous and uninterrupted production of coal, may allow, said Operators shall make deductions so authorized and deliver the same to the designated District officer of the Mine Workers or to such authorized representative as may be designated by the Mine Workers.

District Agreements

New Districts of the United Mine Workers of America may be established.

This agreement supersedes all existing and previous contracts except as incorporated and carried forward herein by reference; and all local agreements, rules, regulations and customs heretofore established in conflict with this agreement are hereby abolished. Prior practice and custom not in conflict with this agreement may be continued, but any provisions in district or local agreements providing for the levying, assessing or collecting of fines or providing for "no strike," "indemnity" or "guarantee" clauses or provisions are hereby expressly repealed and shall not be applicable during the

WHAT MAKES A GOOD PUMP DEALER?

A pump dealer is as good as the line he sells, and the facilities he maintains for servicing his customers' pumps.

You look to a *good* dealer for a *broad* line of pumps—with so many types and sizes that he can give you unprejudiced advice . . .

You look to a *good* dealer for the benefits of a service organization that's ready and able to solve your pumping problems at the drop of a hat . . .

That's why so many pump buyers think of their Fairbanks-Morse dealers as the *best in the business.*

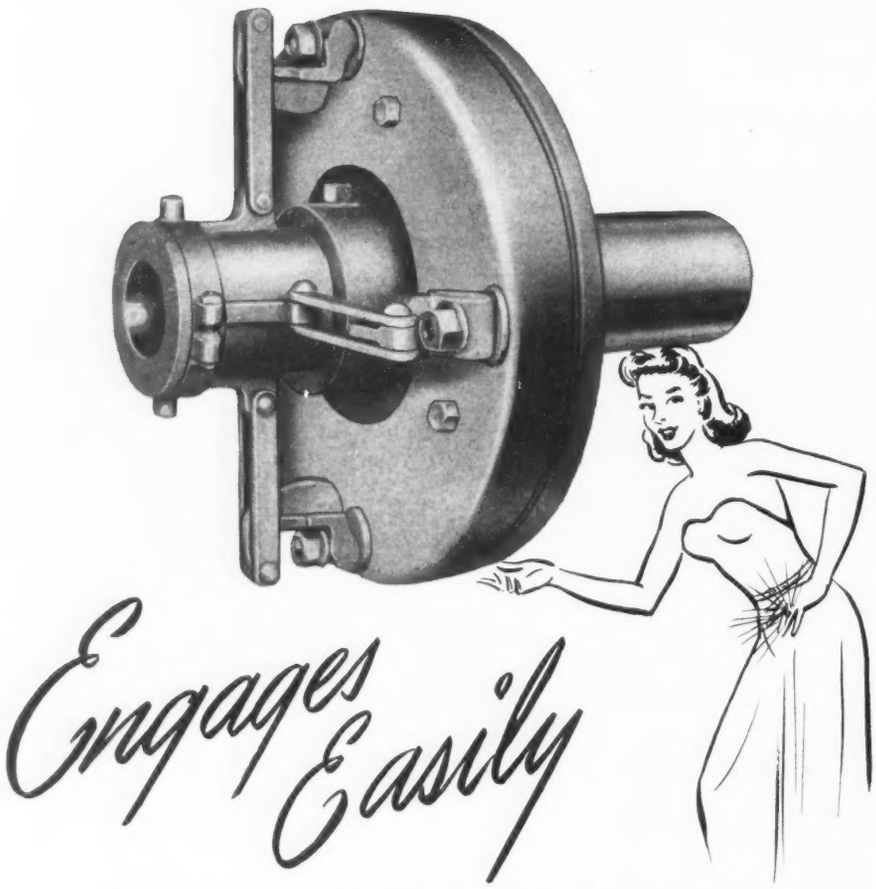
FAIRBANKS-MORSE

A name worth remembering

DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES • MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR CARS and STANDPIPES • FARM EQUIPMENT • MAGNETOS

KINNEY

INTERCHANGE CLUTCH



Engages Easily

The easy engagement of the Kinney Interchange Clutch means real economy and safety in power transmission. A small motor just large enough to run equipment can handle a heavy starting load when driving through a Kinney Clutch. The clutch is built to slip just enough to pick up the load, without lowering the capacity when fully engaged. Only a light pressure on the shift lever is required — engagement is smooth and positive, without grinding or chattering. Since the load may be instantly released and machinery stopped, the clutch provides maximum operating safety. The Kinney Interchange is available in solid or split construction for easy installation; capacities 2 to 40 H.P. per 100 R.P.M.

The line of Kinney Clutches is complete. Write for Bulletin K8.

KINNEY MANUFACTURING CO.

3525 WASHINGTON ST., BOSTON 30, MASS.

New York • Chicago • Philadelphia • Los Angeles • San Francisco

We also manufacture Vacuum Pumps, Liquid Pumps and Bituminous Distributors.

term of this agreement. Wherever a conflict arises between this agreement and any district or local agreement, this agreement shall prevail. When day men are transferred to loading coal the individual affected, if aggrieved, shall have the right of review under the settlement of disputes procedures provided in this agreement.

No district contract or agreement negotiated hereunder shall become effective until approval of such contract or agreement by the International Union, United Mine Workers of America, has been first obtained.

Settlement of Local and District Disputes

Should differences arise between the Mine Workers and the Operators as to the meaning and application of the provisions of this agreement, or should differences arise about matters not specifically mentioned in this agreement, or should any local trouble of any kind arise at the mine, an earnest effort shall be made to settle such differences immediately:

1. Between the aggrieved party and the mine management.
2. Through the management of the mine and the mine committee.
3. Through district representatives of the United Mine Workers of America and a commissioner representative (where employed) of the coal company.
4. By a board consisting of four members, two of whom shall be designated by the Mine Workers and two by the Operators.
5. Should the board fail to agree the matter shall, within thirty (30) days after decision by the board, be referred to an umpire to be mutually agreed upon by the Operator or Operators affected and by the duly designated representatives of the United Mine Workers of America, and the umpire so agreed upon shall expeditiously and without delay decide said case. The decision of the umpire shall be final. Expenses and salary incident to the services of an umpire shall be paid equally by the Operator or Operators affected and by the Mine Workers.

A decision reached at any stage of the proceedings above outlined shall be binding on both parties hereto and shall not be subject to reopening by any other party or branch of either association except by mutual agreement.

House Coal

House coal shall be sold to all employees, for their own household use, at the cost of production, exclusive of sales and administrative costs. Should any differences arise between the Mine Workers and the Operator of any mine as to the price so to be charged for said coal, such differences shall be settled under the terms of the settlement of disputes section of this agreement.

Miscellaneous

1. Any and all provisions in either the Appalachian Joint Wage Agreement of June 19, 1941, or the National Bituminous Coal Wage Agreement of April 11, 1945, containing any "no strike" or "Penalty" clause or clauses or any clause denominated "Illegal Suspensions of Work" are hereby rescinded, cancelled, abrogated and made null and void.
2. Any and all provisions of any contracts or agreements between the parties hereto or some of them whether national, district, local or otherwise providing for a protective wage clause and a modification of this agreement or said agreements if a more favorable wage agreement is entered into by the United Mine Workers of America, are hereby rescinded, cancelled, abrogated and made null and void.

"We cut bearing and gear replacements in our loader heads 90%"

"With Gulf Mining Machine Lubricant B"

says this Superintendent

The Superintendent (left) of this progressive West Virginia mine and the Gulf Lubrication Engineer check the application of Gulf Mining Machine Lubricant B to loader heads.

"WE had a serious problem in our loading machine heads before we switched to Gulf Mining Machine Lubricant B," says this Superintendent. "The lubricant we had been using permitted coal dust to enter the casing with the result that gears and bearings frequently failed. A change to Gulf Mining Machine Lubricant B put a stop to this—reduced bearing and gear replacements 90 per cent."

A heavy-bodied lubricant specially engineered by Gulf technologists for cutting and loading machines, Gulf Mining Machine Lubricant B lasts longer, has greater tenacity, insures less leakage from gear cases, and provides effective lubrication under water conditions. It can help you steer clear of repairs, cut maintenance costs—and at the same time simplify your lubricant storage and handling.

Call in a Gulf Lubrication Engineer today and ask him to demonstrate the many advantages of this superior mining machine lubricant. Write, wire, or phone your nearest Gulf office.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

Boston · New York · Philadelphia · Pittsburgh · Atlanta
New Orleans · Houston · Louisville · Toledo

GULF INDUSTRIAL LUBRICATION

Collyer

POWER CABLES . . .
PORTABLE CABLES

THEY'RE RUGGED

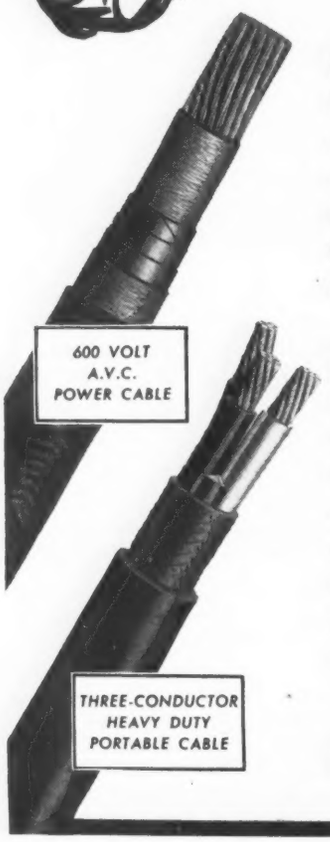
Mining is tough service but Collyer Cables can take it . . . they stand up and deliver full power for maximum production.

THEY'RE SAFE

Asbestos braids or flame-resistant neoprene jackets guard against fires. High dielectric strength insulations handle heaviest voltages.

THEY'RE ECONOMICAL

The long life and trouble-free performance of Collyer Cables make cost per year exceptionally low.



600 VOLT A.V.C. POWER CABLE

THREE-CONDUCTOR HEAVY DUTY PORTABLE CABLE

Collyer Asbestos Varnished Cambric (A.V.C.) Insulated Power Cables are ideal for permanent installations where operating conditions are difficult. Layers of impregnated felted asbestos, heat resisting varnished cambric and tough asbestos braids make this cable safe for temperatures to 230°F. and voltages to 7,500.

Collyer Heavy Duty Neoprene Sheathed Portable Cable meets the requirements of the State of Pennsylvania for flame resistance. Jacket is of tough, lead-cured neoprene with a slick outer surface to shed dirt and grease. This cable is built to stand hard use, abrasion and the constant flexing of reeling and unreeling. Available in many types and sizes for voltages up to 4,500.

Write for information.

Collyer INSULATED WIRE CO.

245 ROOSEVELT AVE., PAWTUCKET, R. I.

3. The contracting parties agree that, as a part of the consideration of this contract, any and all disputes, stoppages, suspensions of work and any and all claims, demands or actions growing therefrom or involved therein shall be by the contracting parties settled and determined exclusively by the machinery provided in the "Settlement of Local and District Disputes" section of this agreement; or, if national in character, by the full use of free collective bargaining as heretofore known and practiced in the industry.

Termination of Agreement

This agreement dated July 7th, 1947, shall be effective as of July 1, 1947, and shall terminate June 30, 1948, **Provided, However,** that either the "Parties of the First Part" or "Party of the Second Part" may terminate this agreement on any earlier date by giving at least thirty (30) days' written notice to the other party of such desired earlier termination date.

The foregoing termination provision shall not be construed to limit or affect in any way the obligations of the parties relating to the termination of contracts under the "Labor-Management Relations Act, 1947."

National Conferences

It is hereby stipulated and agreed by all parties signatory hereto that they, and each of them, will attend any conference or conferences held under the terms of this agreement and that such conference or conferences shall be convened at Washington, District of Columbia, unless such place of meeting is changed by mutual agreement of the parties.

Integrated Instrument

This agreement is an integrated instrument and its respective provisions are interdependent and shall be effective from and after July 1, 1947.

In Witness Whereof, each of the parties signatory hereto, pursuant to proper authority, has caused this agreement to be signed by its proper officers or representatives at Washington, D. C., this —— day of July, A. D., 1947.

•

Victoria Brown Coal Under Development

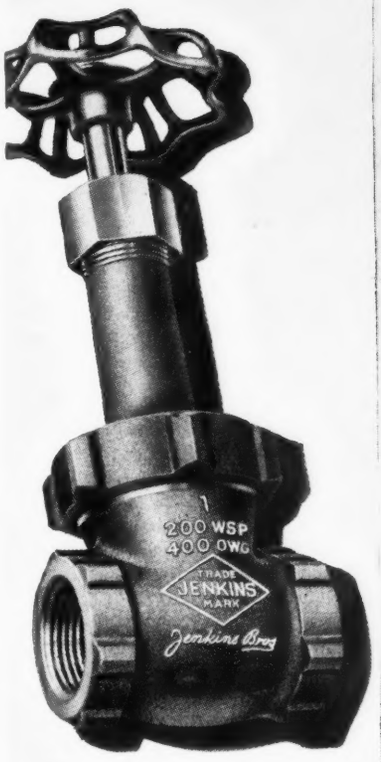
To meet the demands of expanding industry for coal, new lignite fields recently have been opened up in Victoria, Australia, which are expected to be developed under private ownership to be an important factor in the area's fuel supply, according to a report by Len Barker, from the Australian News & Information Bureau.

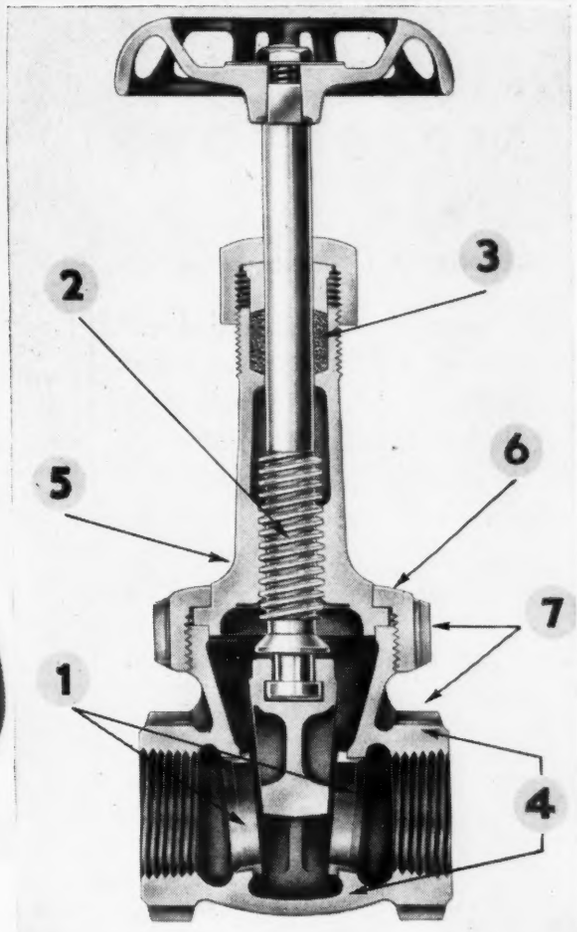
Since 1925, electricity produced from brown coal mined by stripping at Yallourn, 90 miles from the state capital of Melbourne, has supplied Victoria, which for its size and population is the most industrialized of the six Australian States, with most of its domestic and industrial power. But, although 5,500,000 tons of brown coal is produced annually at Yallourn, only a fraction is available to industry as raw fuel. Victoria is not well endowed with black coal, and the long haul from Newcastle, New South Wales, has made Victoria keen to develop nearer industrial fuel supplies.

For many years, experts had urged Victorian industrialists to make themselves independent of interstate coal by using lignite, but they were de-

IT'S NEW . . . IT'S FAR AHEAD — IN DESIGN—IN DURABILITY

JENKINS FIG. 270-U BRONZE GATE VALVE





1. "MONEL" SEAT RINGS EXPANDED IN BODY The seat rings, expanded into place in the body, are equivalent to integral faces. The "MONEL" metal used is about 2½ times the hardness of valve body bronze—provides exceptional resistance to erosion and corrosion.

2. LARGE SPINDLE THREADS LAST LONGER The threads on the traveling spindle are exceptionally long and large in diameter, which reduces wear to a minimum and insures easy operation. Spindle metal is hard, tough manganese bronze.

3. DEEP STUFFING BOX—MORE PACKING Deeper than most 200 lb. gate valves, it holds more packing. Keeps stuffing box tight around spindle with less friction, and packing nut can be turned with less effort.

4. LIBERAL BODY DIMENSIONS ADD STRENGTH Made of 35,000 lb. tensile strength cast bronze—has full length of pipe threads and liberal clearance between threaded ends and diaphragm wall. Union assembly reinforces and strengthens body neck.

5. EXCEPTIONALLY RUGGED BONNET Projection on bottom assures snug fit into neck of body. Large diameter Acme threads, with long bearing, assure improved wear resistance. Machined bevel on underside matches beveled shoulder on spindle for back-seating under pressure and protecting spindle threads when valve is wide open.

6. HEAVY BONNET RING Union Bonnet joint withstands exceptionally high hydraulic pressures. Liberal thread engagement assures assembly that can be made tight and kept tight after repeated disassembly.

7. BODY AND BONNET RING LUGS Rugged sturdy lugs of novel design on body ends and bonnet ring permit repeated application of conventional wrenches.

AGAIN JENKINS PRACTICAL ENGINEERING SETS THE STANDARD FOR VALVE ECONOMY

• *IF ANY PART of the seating combination is to eventually need replacement, why not have it the most accessible part—the wedge rather than the seat? It's easier, quicker, cheaper to slip on a new wedge, than to install a new body!*

That's the principle on which Jenkins Engineers designed the new Fig. 270-U Bronze Gate Valve, with a high-quality bronze wedge seating against MONEL seat rings expanded in the body. With this sensible design, the wear affects only the most accessible part—the bronze wedge—which can be replaced by simply slipping it off the stem and slipping on a new one. Prolonged tests, in toughest service, prove it the best seating combination to beat wear, reduce care.

This new, better Fig. 270-U will give you unequalled economy in any service requiring a 200 lb. pressure Bronze Gate, and especially under severe conditions, such as in oil refineries, dye houses, chemical, food, and rubber plants.

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WRITE FOR THIS FOLDER (Form No. 181-A). It describes the Fig. 270-U and many other popular Jenkins Bronze Gate Valves. Or, ask your Jenkins Distributor.

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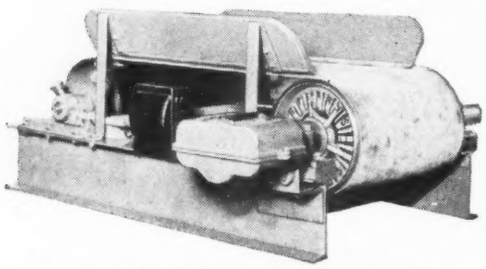
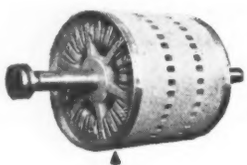
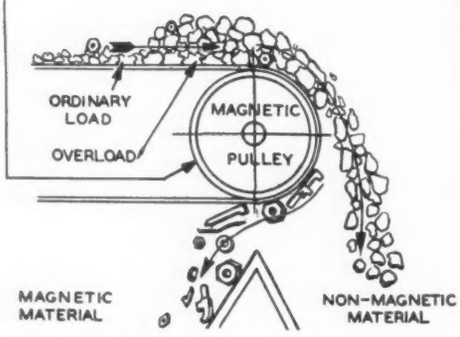
For complete specifications and operating data write for our new Bulletin 303.





Completely self-contained Magnetic Pulley type Separator with belt, tail pulley, frame—or with two magnetic pulleys, depending upon your capacity and separation desired.



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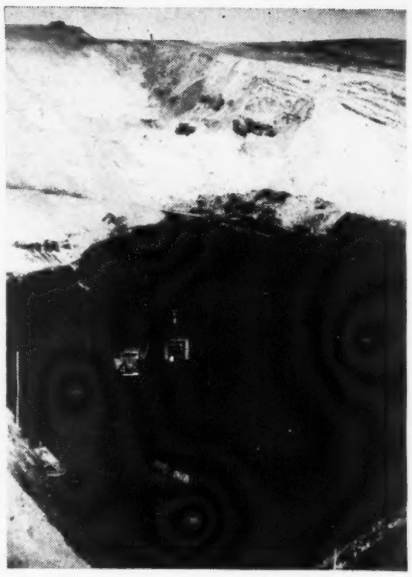

OPEN-CUT PIT operated by the Maddingly Brown Coal Co., 35 miles from Melbourne, is now producing 4,000 tons of lignite weekly. Overburden is to be replaced and the land restored to pasture.

terred by the cost of adapting furnaces and boilers to burn lignite instead of black coal.

In 1943, however, when Australia's black coal supplies were strained to the limit, three separate companies were established to open a rich new field of brown coal at Bacchus Marsh, within 35 miles of Melbourne. These companies are now operating mines and expect to increase production appreciably in the near future.

Lying at depths varying from 19 to 100 ft. underground, the Bacchus Marsh brown-coal field is the end of a seam 30 miles long by 10 miles wide and from 70 to 100 ft. thick, which begins on the outskirts of Melbourne.

All but the last three miles of this seam is covered by an overburden of basalt to a depth of up to 421 ft., precluding the simple open-cut method of mining, except in the Bacchus Marsh area, which is free of basalt.

The three companies started operations over a total area of 640 acres estimated to contain 100,000 tons of lignite to the acre. Within four months they had excavated a total of nearly 1,000,000 tons of earth to open the seam.

The largest of the open-cuts, owned by Maddingly Brown Coal Co., covers approximately four acres. It is operated by the Australian Paper Manufacturers, Ltd., one of the first private undertakings to use lignite. The present weekly output of the Maddingly open-cut, 4,000 tons, is entirely absorbed by the firm's mills. When production is stepped up, however, coal will be sold in the open market.

The other two open-cuts are 3½ and 2 acres in extent and their combined production equals that of the Maddingly Co. They plan to increase production considerably in the near future when improved equipment is available.

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CAST PARTS that protect industry AGAINST WEAR

Dipper Lip

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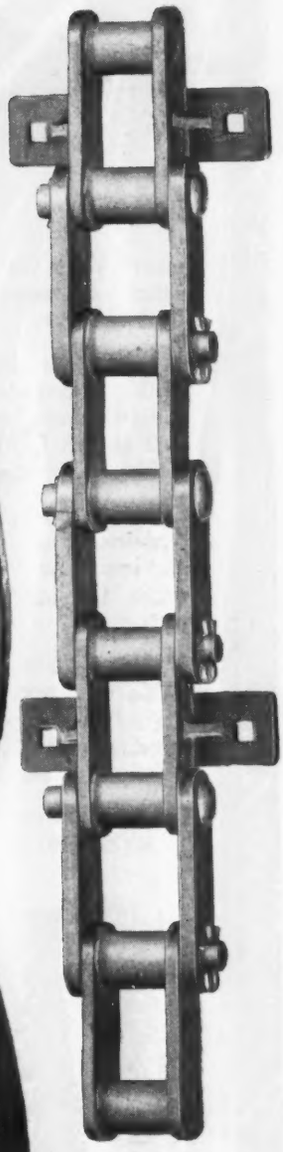

Combination Chain with Attachments

Dredge Cutter Head

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Continued impact only serves to harden the surface of austenitic manganese steel up to 550 Brinell — develops a smooth "plow-share" finish that resists abrasion . . . yet the body metal always retains its basic toughness.

Amsco specializes in cast manganese steel parts that have to take it . . . in dredging, crushing, pulverizing, excavating, road-building, mining and quarrying . . . for almost any use that requires real service under the most adverse operating conditions. Write for bulletins and information today.

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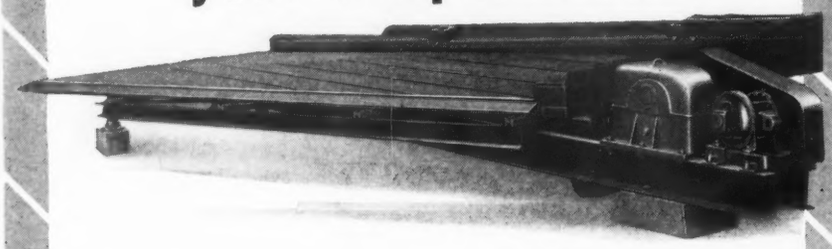
SuperDuty COAL WASHING TABLE for Perfection in your Preparation



Here is the Coal Washing Table that offers production efficiency, ease of operation and economy . . . first, last and always.

With 75% more working riffles placed in the natural path of separative action, SuperDuty washes coal quicker and cleaner. In fact, so little combustible material is left in the refuse produced that retreatment is neither practical nor economical.

Operation is so simple that an employee with little training can supervise a large battery of SuperDuty Tables. The few necessary adjustments can be made while the table is in operation. Head motion is self-oiling.

In SuperDuty, scientific engineering has perfected a table of rugged construction and simple action. Long wear and low maintenance cost is assured. Power requirement is low, too—approximately 1 H. P. under continuous full load operation.

Many other advantages in using SuperDuty Tables are explained in Bulletin 119. Write today for full details.

CONCENCO FEED DISTRIBUTOR

The Concenco Revolving Feed Distributor is a heavily fabricated all-steel machine, built in various types, with motor drive requiring less than ¾ H. P. in operation. This distributor effects perfectly a splitting of coal feed sluiced through its revolving tank, into any desired number of equal portions. It is especially suitable for efficiently feeding a battery of coal washing tables, giving an equal distribution of feed to each table.

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CONCENCO PRODUCTS

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Illinois Law Provides For Coal-Use Study

Gov. Dwight H. Green last month signed H. B. 868 creating a commission of two representatives, two senators and two members appointed by the governor to continue study and experiments in the manufacture and use of Illinois coal and coal products.

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Personal Notes

William F. Hahman, formerly vice president in charge of production for the Juliette Coal Co. and the Denise Coal Co., Pittsburgh, has been named vice president (operations), Cedar Grove Collieries, Inc., Cedar Grove, W. Va., recently acquired by the Dexter-Carpenter Coal Co., Inc., New York. Mr. Hahman, who from 1938 to 1946 served with the Bituminous Coal Division, the Solid Fuels Administration and other government agencies, has had many years experience as a mining engineer and official and at one time was connected with, among others, the Enos Coal Mining Co. and the Forks Coal Mining Co.

Ed. A. Leming has resigned as general superintendent for the Union Colliery Co., Dowell, Ill., because of ill health. Mr. Leming, who will continue with the company in an advisory capacity, is to be succeeded by **John Harvey,** construction superintendent at the New Kathleen mine.

R. A. Sansing, superintendent, Margaret mine, Alabama Fuel & Iron Co., Margaret, Ala., for the past 30 years, has retired, bringing to an end a career of 53 years as a miner, mine foreman and superintendent. Mr. Sansing first went to work at the age of 11 in the Brockton mine of the Tennessee Coal, Iron & R. R. Co., joining Alabama Fuel after 16 years with T., C. & I.

Benjamin F. Pepper has been named president, Castle Shannon Coal Corp., Pittsburgh, Pa.

Frank C. Wright Jr., Washington representative for the anthracite industry since 1942, has resigned. Mr. Wright, who was formerly with the Penn Anthracite Collieries Co., and later a vice president of the Philadelphia & Reading Coal & Iron Co., is vacationing and has not yet announced his future plans.

The Hudson Coal Co., Scranton, Pa., has announced personnel changes, as follows: **Adolph Arnold,** outside foreman at the Coal Brook mine has retired and has been succeeded by **James R. Austin,** formerly maintenance foreman at Gravity Slope mine. At Grassy Island mine, **Paul J. Brennan,** section foreman, has been appointed yardage checker, **Daniel G. Muncie** has been named sec-

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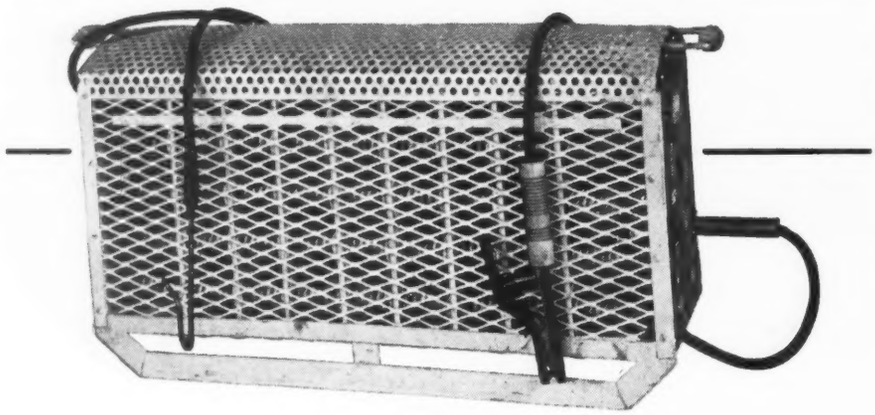

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tion foreman, and **George L. Robinson,** fireboss. **Richard Bowen,** fireboss at Pine Ridge colliery, has been named section foreman at Loree colliery.

W. L. DOOLITTLE, president, Consolidation Coal Co. (W. Va.), Fairmont, W. Va., has been named president of Brock, Inc., and Christopher Coal Co., Morgantown, W. Va., and Pursglove Coal Mining Co., Pursglove, W. Va., Consolidation subsidiaries.

Consolidation Coal Co. (Ky.), Jenkins, Ky., has announced several recent promotions. At the Clover Split mine, **Clyde A. Milsap** has been made section foreman, and **Theodore Hensley** and **Lafayette Cox** have been promoted to mine examiners. **J. W. Necessary, Bruce Phelps, Marvin Akers, John O'Bryan and Arthur McCoart** have been advanced to section foremen at Mine No. 155. **Worley Mace** has been named section foreman at Mine No. 214 and **Palmer Scott** section foreman at Mine No. 207. **Paul Jessee,** assistant line foreman, has been appointed line foreman in the power department, replacing **P. S. Wheeler,** retired.

Jack Rider has been appointed safety director for the mines of the Lorado Coal Mining Co., Lorado, W. Va.

Charles T. Holland, secretary-treasurer, Central Appalachian Section, A.I.M.E., has been promoted from associate professor to professor of mining engineering, School of Mines, West Virginia University, Morgantown.

Dr. M. M. Leighton, for the past 24 years chief, Illinois State Geological Survey, Urbana, Ill., was recently cited as a "Distinguished Alumnus" by the State University of Iowa at its recent commencement and centennial celebration. Dr. Leighton, who was cited in recognition "of his eminence in his chosen field of geology and of his contribution to the public welfare," received his B.A. degree from Iowa in 1912, at which time he was the recipient of the Hon. Frank O. Lowden prize in Geology. He received his M.S. degree from Iowa in 1913 and a Ph.D. degree from the University of Chicago in 1916.

Obituaries

James D. Moffat Jr., 47, vice president in charge of operations, Moffat Coal Co., Sparta, Ill., died suddenly June 30 of heart disease.

Alexander C. Beeson, 70, most recently umpire for the Northern West Virginia Coal Association and the U.M.W., died June 13 at his home in Mannington, W. Va., following a heart attack. Mr. Beeson had had a long career in coal mining, having been associated with the Pittsburgh & Buffalo Coal Co. and the Four States Coal Co. and also affiliated with the West Virginia Department of Mines.

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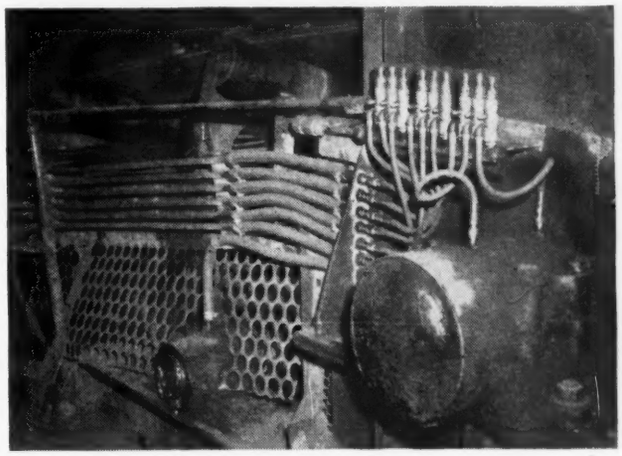
CENTRO-MATIC LUBRICATING SYSTEMS

Specifically engineered for flexibility of application, simplicity of installation, and dependable operation, these *single line* centralized lubricating systems deliver oil or grease to bearings by positive displacement, under line pressure, providing greatest assurance of proper lubrication—in seconds instead of hours. All that is required is a Centro-Matic Injector for each bearing, arranged singly or in manifold, and connected by only a *single lubricant line* to a Centro-Matic Lubricant Pump. Illustrated below are the various types of injectors, pumping units and accessories from which a selection can be made to meet the particular requirements of a single machine or a battery of machines.

Save bearings . . . Power . . . Machine Hours . . . Man Hours and prevent accidents—install Centro-Matic Systems on all of your plant equipment that requires periodic lubrication.

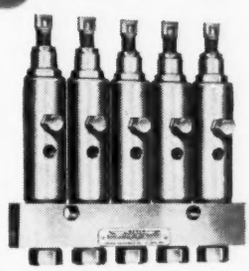


Centro-Matic Lubricant Injectors on a Coal Shaker.

TYPES OF INJECTORS...

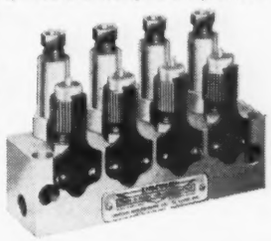
LINCOLN SERIES SL-1 INJECTORS

Available in two types, the No. 81713 for individual mounting and the No. 81713A for mounting in manifold. Injectors will handle lubricants ranging from machine oils to fibrous greases. Lubricant output adjustable up to .04 ozs. Units include External Adjusting Nut, Indicator Stem, and Fitting for initial filling of feeder line and visible check on quantity of lubricant discharged. Manifold assemblies are available with from 2 to 5 injectors, and may be mounted vertically or horizontally. Any combination of manifold units may be connected in series or mounted one above the other.

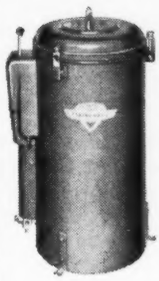


LINCOLN SERIES SL-3 INJECTORS

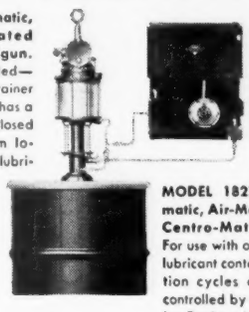
Compact, space-saving design of the Series SL-3 Injectors makes them especially desirable when mounting space is limited. Injectors in manifolds of two, three and four units are provided where conditions favor group mounting. Discharge of Injectors is by positive displacement. Units include Adjusting Knob with spring clip-lock and Indicator Stem. SL-3 Injectors may be mounted vertically or horizontally, and any combination of same can be connected in series, as with the SL-1 Injector. Lubricant output adjustable up to .004 ozs.



TYPES OF PUMPING UNITS...



MODEL 1825 Automatic, Air-Motor Operated Centro-Matic Lubrigun. Automatically controlled—manually timed. Container capacity 60-lbs. Unit has a compact, totally-enclosed pumping mechanism located beneath the lubricant container.

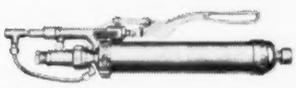


MODEL 1827 Full Automatic, Air-Motor Operated Centro-Matic Lubrigun. For use with original 400-lb. lubricant containers. Lubrication cycles automatically controlled by automatic Timing Device with signal alarm.

MODEL 1840 Full Automatic, Electric-Motor Operated Centro-Matic Lubrigun. Lubrication cycles automatically controlled by Timing Device. Motor—110 Volts A. C. 60 cycle, single phase. Container capacity 30 lbs.

MODEL 1806 Manually Operated Centro-Matic Lubrigun. Capacity 10-lbs. Has large button head fitting for attaching Filler Pump Hose.

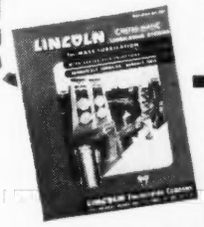
MODEL 1805 Manually Operated Centro-Matic Lubrigun. Capacity 2-lbs. Has large button head fitting for attaching Filler Pump Hose.



MODEL 1807 Portable, Manually Operated Centro-Matic Lubrigun. Capacity 1-lb. Spring Primed. Unit includes 18" Whip Hose Assembly.

ACCESSORIES...

A complete line of installation accessories—copper tubing, high pressure, flexible lubricant hose, fittings, clips and everything needed to make the installation are available.



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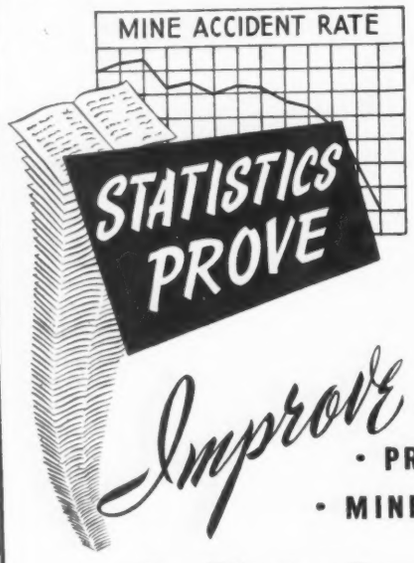

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There are eighteen types of Mescoweld Rail Bonds, each designed to do a perfect bonding job. Type M8-F (illustrated) features an extra pocket which adds 15% to the welding area and materially lowers electrical resistance. At the same time, the terminal socket of the bond is protected by the base of the rail.

Immediate deliveries are available on all Mescoweld Rail Bonds. Freight is allowed on shipments of 100 lbs. or more to all points to East bank of Mississippi. Write or telephone for complete information.

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Preparation Facilities

H. C. Frick Coke Co., Robena Slope mine, Greene County, Pennsylvania—Delivery by the Deister Concentrator Co. of 16 SuperDuty Diagonal-Deck No. 7 coal-washing tables; completed plant to contain a total of 48 of the same units. Also delivered, three Concenco revolving feed distributors.

Buck Run Colliery Co., Buck Run, Pa.—Contract closed with the Deister Machine Co. for two No. 16 Deister PLAT-O coal-washing tables to handle No. 5 anthracite buckwheat; normal rated feed capacity for the two tables 30 t.p.h.

Oxford Coal Co., Pittston, Pa.—Delivery by Deister Concentrator Co. of six SuperDuty Diagonal-Deck No. 7 coal-washing tables to handle No. 4 buck; two 4x7-ft. single-surface motor-driven Leahy NO-Blind vibrating screens; and one Model 105 Concenco revolving feed distributor for distribution of feed to tables.

Jonathan Coal Co., Dornsife, Pa.—Delivery by Deister Concentrator Co. of one SuperDuty Diagonal-Deck No. 7 coal-washing table to handle No. 4 buck.

•

Association Activities

Kentucky Coal Association at its annual meeting in Louisville, June 27, reelected as president Brent Hart of Madisonville. George P. Fitz, Hazard, was elected vice president and C. X. Johnson, Lexington was named secretary-treasurer.

Stoker Manufacturers' Association, at its 30th annual meeting at Lookout Mountain, Tenn., elected the following officers: president, G. W. Graham, Eddy Stoker Corp., Chicago; vice president, C. A. Potts, U. S. Machine Corp., Lebanon, Ind.; secretary-treasurer, F. H. Herndon, Link-Belt Co., Chicago; and executive secretary, Marc G. Bluth.

•

Coal Publications

Meeting the Special Problems of Small Business: A Statement on National Policy. Research and Policy Committee, Committee for Economic Development, 285 Madison Ave., New York 17. 61 pp. 8½x11-in.; paper. The committee's program to strengthen small business' management, finance, taxation and competitive opportunity. Problems of technical research, long-term credit and capital equity, with a point-by-point program for their solution.

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Don't let costly leaks and drips "drown out" efficiency on your mine operations. For tight sealing of pumps, flanges, valve stems, piston rods—pack 'em tight with Quaker quality packings that give you long-lasting, leak-proof service.

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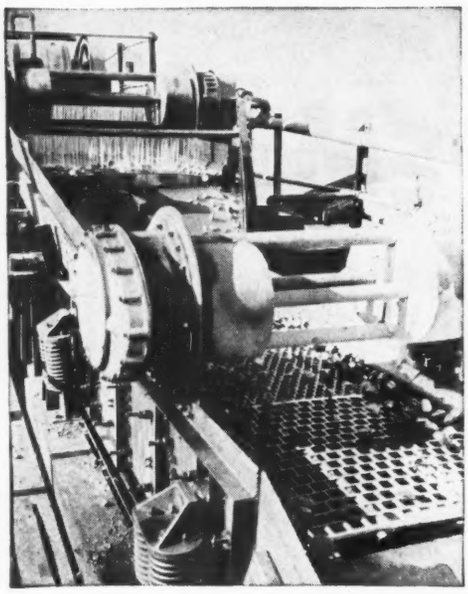
Toughened by an exclusive Hendrick heat-treatment process, Hendrick perforated metal plate withstands abrasion and maintains uniformity of mesh throughout unusually long service life. It is furnished in any desired gauge and size of openings to meet specific requirements. Write for detailed information.



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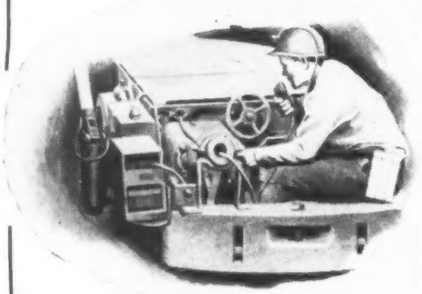

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Illinois Mineral Industry in 1945, by W. H. Voskuil, D. F. Stevens and N. T. Hamrick. Report of Investigations No. 121, State Geological survey, Urbana, Ill. 116 pp. 6¾x10⅞-in.; paper. Free. Total value of minerals produced and processed in Illinois in 1945 was $527,901,000, of which coal produced represented $163,786,600. Illustrations, tables and charts.

Coal Reserves in Kansas, by G. E. Abernathy, J. M. Jewett and W. H. Shoewe. State Geological Survey of Kansas, Lawrence, Kan., Bulletin 70, Part 1. 20 pp. 6⅛x9⅛-in.; paper. 10c. Proved and potential reserves by beds and by counties; descriptions of coal-bearing rocks with interbedded coals. Proved reserves, 949,323,000 tons; potential reserves, 17,574,000,000 tons.

Minerals Yearbook, 1945. U. S. Bureau of Mines, Department of the Interior. 1,689 pp. 6½x9-in.; cloth. $4, Supt. of Documents, Government Printing Office, Washington 25. Complete data for 1945, marking a return to prewar coverage, with a new section on foreign minerals. Other sections are a general summary, metals, non-metals and mine safety.

Bibliography of Bureau of Mines Investigations of Coal and Its Products, 1940-45, by A. C. Fieldner, P. L. Fisher and M. B. Pollock. U. S. Bureau of Mines, Technical Paper No. 698. 15c., Supt. of Documents, Government Printing Office, Washington 25. Nineteen divisions: general publications; sampling, analyzing and testing; occurrence; classification; physical and chemical properties; gases and dusts; mining; mine water; preparation; sizing; cleaning; briquetting; storage; carbonization; gasification; hydrogenation and synthetic products; coke; gas; tar and other byproducts; combustion; smoke abatement; economics and statistics; and motion-picture films.

The American Management Association, 330 West 42d St., New York 18, from time to time publishes brief booklets on management problems and opportunities. Some of the recent publications are listed below:

1. An Outline of the Supervisor's Job, by J. M. Pfiffner. 20 pp. 5½x8½-in.; paper. 25c., quantity prices on request.
2. Preparation of Company Annual Reports, by Ernest Dale. Research Report No. 10. 6x9-in.; paper. For members, $2; for non-members, $3.
3. Overhauling Pension and Profit-Sharing Plans, by M. M. Goldstein. Financial Management Series No. 83. 32 pp. 6x9-in.; paper. 50c.
4. Advances in Personnel Management. 8 pp. 5½x8½-in.; paper. Free. A check list of significant A.M.A. publications for personnel administrators.
5. Regularized Employment—Problems and Possibilities, by Matthew Radom and J. L. Snider. Personnel Series No. 105. 22 pp. 6x9-in.; paper. 50c.
6. Management Techniques for Increasing Labor Productivity, by C. F. Roos, Albert Ramond and others. Production Series No. 163. 51 pp. 6x9-in.; paper. 75c.
7. Quality and Expense Control, by S. P. McDaniels, J. M. Juran and D. R. Caminez. Production Series No. 164. 24-pp. 6x9-in.; paper. 50c.
8. Getting and Using Employees' Ideas, by F. A. Denz, H. W. Seinwerth, L. J. Alger, R. E. Loesges, W. E. Byrne and H. C. Marmaduke. Production Series No. 165. 31 pp. 6x9-in.; paper. 50c.
9. The Foreman—The Job and the Man, by C. F. Mugridge, C. W. Hodges and C. W. Lytle. Production Series No. 166. 31 pp. 6x9-in.; paper. 50c.
10. Human Relations Opportunities for Management, by R. W. Johnson, C. H. Cox and E. G. Planty. Production Series No. 167. 34 pp. 6x9-in.; paper. 50c.
11. Production Policies for Increased Output, by J. D. Gill, J. L. Trecker, F. A. Schotters and S. G. Yulke. Production Series No. 169. 36 pp. 6x9-in.; paper. 75c.
12. The Human Aspects of Methods Improvement, by Jack Wolfe, J. C. Spickler, J. M. Talbot, W. B. Given Jr. and R. T. Leonard. Production Series No. 170. 50 pp. 6x9-in.; paper. $1.

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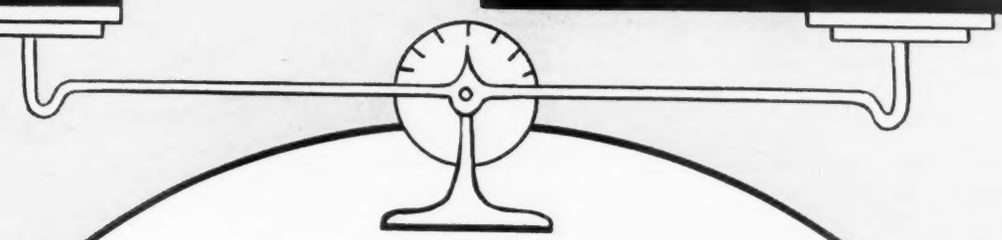

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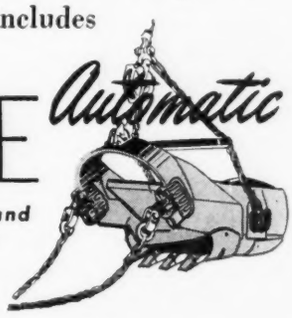

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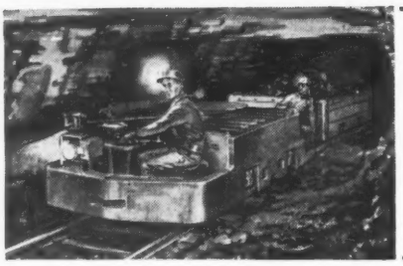


Equipment News

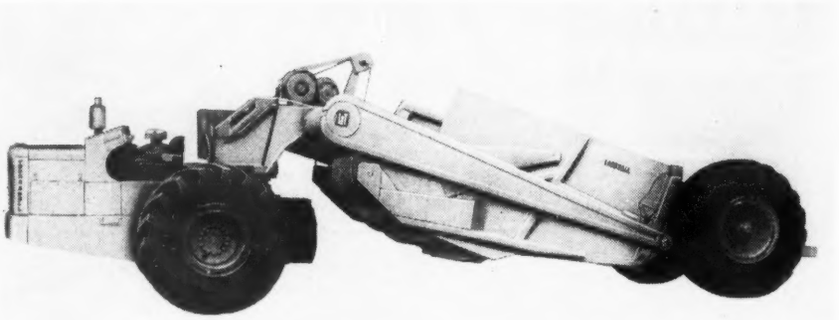
More Detailed Information and Descriptive Literature Normally Are Available on Request Directly to the Manufacturer

Earthmover

R. G. LeTourneau, Inc., Peoria, Ill., has announced another model in its line of high-speed, electrically-controlled earthmoving equipment—the 35-ton-capacity Model B Tournapull. Powered by a 225-hp. diesel engine, this prime mover is available for use with two sizes of scrapers—the new E-45 Carryall, having a 35-ton (26.1-yd.-struck) capacity, or the 25-ton E-25 Carryall (16½-yd.-struck capacity). Designed for fast hauling, the unit has four speeds forward, two reverse, travels up to 15 m.p.h.

New developments in the design of the Tournapull include electric control, Tournamatic constant-mesh transmission and Tournamatic differential, according to the manufacturer. Tournapull steering, Carryall bowl, apron and tailgate are all controlled by individual electric motors, replacing conventional steering principles and eliminating the need of a power-control unit for scraper operations. Tournapull and scraper operations are now finger-tip controlled by means of buttons on the Tournapull dashboard.

Tournamatic constant-mesh transmission does away with the ordinary foot clutch. All the operator does is move a level into the desired gear, giving non-stop, instantaneous speed selection. The newly designed torque-proportioning Tournamatic differential automatically supplies the most power to drive wheel having the firmest footing, according to the manufacturer, and gives positive control, greater traction regardless of underfoot conditions. Neither wheel will spin independently of the other. Positive power steering enables the operator to lock the Tournapull and Carryall into a single unit and keeps rig traveling in a desired direction. Selective two-speed steering gives fast control in tough going.

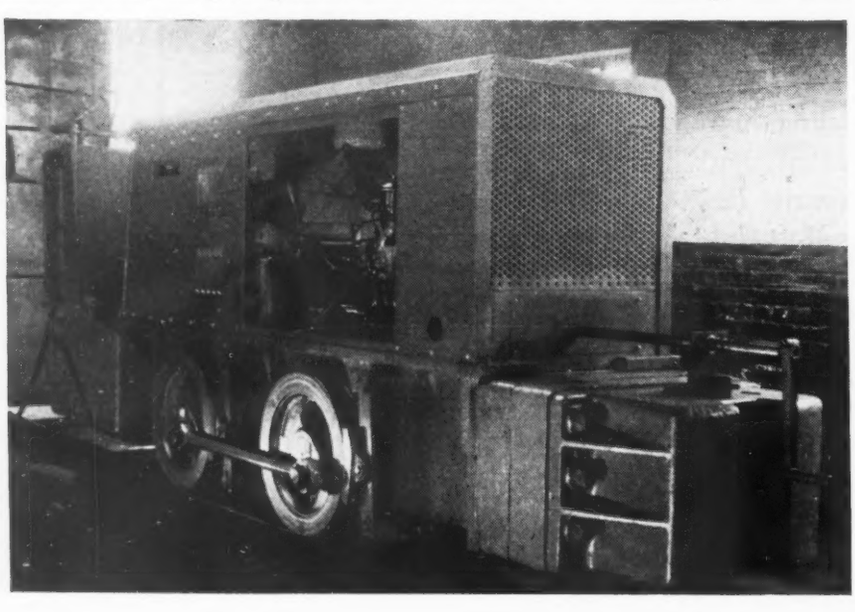


Over-all specifications of the new B Tournapull with E-35 Carryall are: length, 37½ ft.; height, 11¼ ft.; width, 11 ft. 7 in.; wheelbase, 23 ft. 8½ in.; minimum turning radius, 33 ft.; and empty weight, 20¼ tons. This unit can make a 90-deg. turn in either direction. Both the B Tournapull and Carryall are mounted on 24.00x29 tapered-bead tires.

•

Diesel Locomotive

Production of an explosion-proof, diesel-powered mine locomotive, based on the design used by the Deutze Co. of Germany, has been announced by the Columbia Aircraft Products, Inc., Somerville, N. J. The locomotive shown in the accompanying illustration is a 6½-ton model and the company is understood to have designed larger models for future production.



One of the main safety features, according to the manufacturer, is the use of flame traps on the engine intake and exhaust systems, which incorporate a water injector that sprays and cools the exhaust gases as they are emitted from the engine. Extensive tests conducted by the mechanical-engineering department of Lehigh University, the company states, have shown that the CO emitted from the exhaust is practically non-existent and that the heat of the exhaust is much reduced from its original temperature.

The locomotive is powered by a two-cylinder Hercules DIXD engine with a Twin Disc clutch and a flexible coupling to a Cotta transmission unit. It is started by compressed air carried in two tanks at the rear of the engineer's cab, and this model may also be started by a hand crank. There are four speeds forward and four reverse. The brake system consists of four-wheel brakes operated manually through screw-wheel action.

Over-all specifications of the 6½-ton model are: width, 35⅜ in.; length, 143 in.; height, 55 in. Track gage can be varied to fit the user's requirements.

•

Oil Treatment

The newly designed Viking Dual Package Unit, especially designed to handle heavy bodied oils for coal treating, has been announced by the Viking Machinery Sales Corp., Jackson, Mich. The new models are designed to maintain the proper balance of heat and pressure, taking out the variables in the change of viscosity

For 33% More Units Per Ton

with equivalent steel tonnage

USE J&L OTISCOLOY

HIGH-TENSILE STEEL

You can begin to balance your production with demand by making more units per ton of steel. Less steel per unit is made possible by the extra strength of J&L Otiscoloy High-Tensile steel. This saving in dead-weight over products made of carbon steel has been used to advantage by many manufacturers who reduce the steel per unit 25%, increase their unit production 33%. Write for full information.

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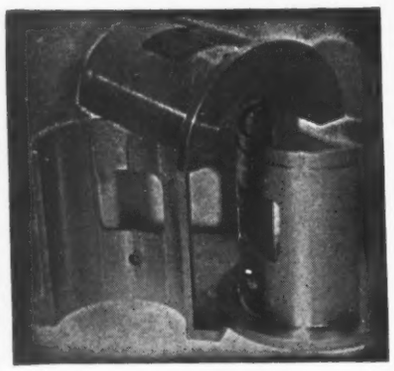
EQUIPMENT

A SPECIFIC FORMULA FOR EACH APPLICATION MAKES FOR LONGER LIFE



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Round, hexagon, square. Rough cast, semi-finished. Cored stock all sizes (by 1/8" steps) from 1/2" minimum core to 12" O.D. and 12" lengths. 6 grades of hardness.

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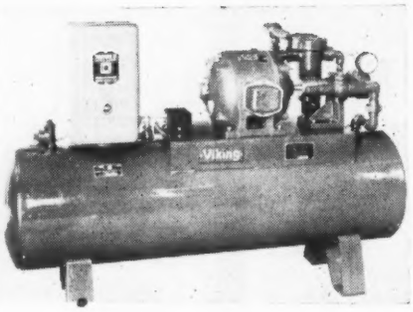
WILLIAMSON, W. VA., Williamson Supply Co. . . . . Phone 1200



because of temperature changes, to provide uniform coal treatment regardless of outside temperature, according to the manufacturer. The DPU models can handle any grade of oil necessary and will permit the use of heavy oils available at lower cost, it is said. The new nozzle manifold heater heads are especially engineered for use with heavy bodied oils.

•

Safety Container

A new line of safety containers, called Safe Guard, has been announced by the General Detroit Corp., Detroit 7, Mich., and its West Coast subsidiary, The General Pacific Corp., Los Angeles 21. They are available in 1-, 3- and 5-gal. sizes and bear the approval of Underwriters' Laboratories and Associated Factory Mutuals for storing and carrying flammable and volatile liquids.

•

Shovel Combination

Marion Power Shovel Co., Marion, Ohio, has announced a new ¾-cu. yd. machine—the 33-M—which with various front-end combinations is a shovel, dragline, clamshell, crane and backhoe. Features of the new Marion, according to the manufacturer, include Marion air control, a greatly simplified machinery deck with only two shafts across it, simple changeovers for front-end equipment, the use of 22 ball and roller bearings. Only 12 gears are used in the entire machine.

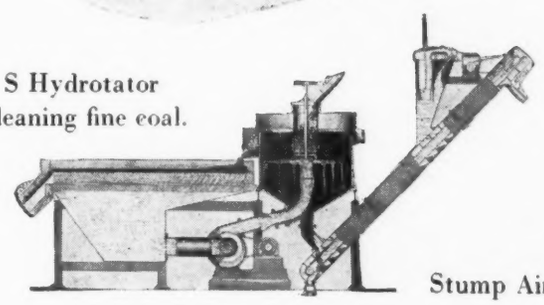
Trucks

Added features for the comfort and safety of the driver, as well as numerous mechanical improvements, are incorporated in its new "Advance-Design" line of trucks and commercial cars, according to a recent announcement by the Chevrolet Motor Division of General Motors Corp. One of the main features of the new Chevrolets are cabs 8 in. wider and 7 in. longer, with larger windshield and windows. The new fully adjustable seat, which accommodates three persons comfortably, moves forward or backward on an inclined plane to provide maximum vision for the driver. A further contribution to driver comfort and safety, according to the manufacturer, is an optional new and revolu-

tionary ventilating system, which draws fresh air from the outside, forces used air out through vents at the rear of the cab, and minimizes fogging of windshield and windows.

Chassis and bodies have been designed with full recognition of the general utility of trucks, it is said, with longer wheelbase, larger bodies and better load distribution, plus heavier, stronger frames. The new trucks are produced in a wide variety of models on nine wheelbases for practically every type of hauling. Gross vehicle weights range from 4,000 to 16,000 lb. The vehicles are powered by either Thrift-Master or Load-Master engines, depending upon

HERE IS A MAN WHO MAKES HIS COAL WORTH MORE



R & S Hydrotator
for cleaning fine coal.

This man and other smart coal producers extract every ounce of revenue from every ton of coal they mine. Only through planning and careful engineering can this be done—a Roberts & Schaefer specialty for over forty years—which has developed the Hydrotator Process illustrated here and used in so many successful coal cleaning plants.

It will be worth your while to consult Roberts & Schaefer about their Hydrotator, Hydro-Separator and Stump Air Flow Process and specialized engineering service.

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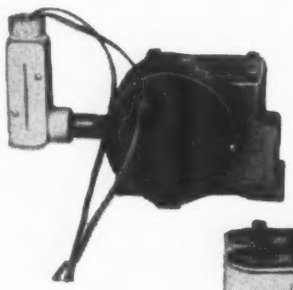
Air Alarm!

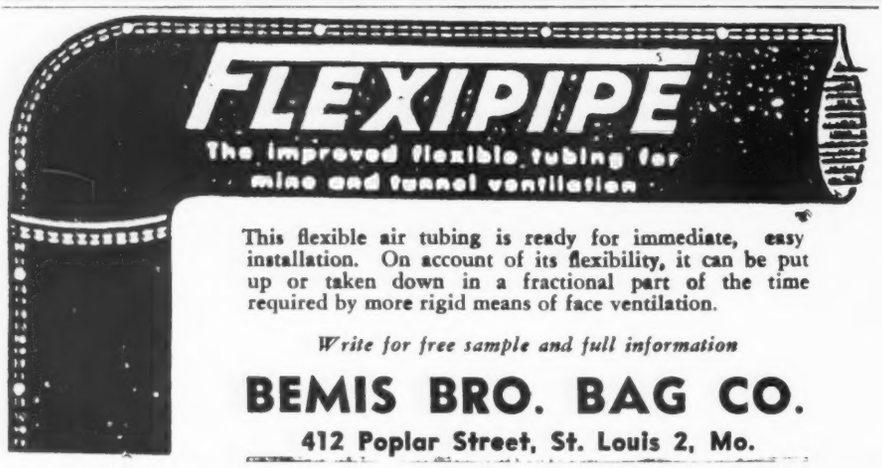


Roxbury Air Alarm only, without blinking light to give you revolutions of your fan $87.50.

Roxbury Visual and Audible Mine Fan Signal with blinking light complete — $124.00.

Write for descriptive circular today.

ROXBURY
MACHINE SHOP, INC.
JOHNSTOWN PA.



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MORE HAULAGE FOR 20% LESS BATTERY CAPACITY

Double knee-action; better trackability. Floating power; less power consumption. Quick acting footbrake — essential for quick stopping, especially behind loading machines. Brake shoes that follow wheels (due to knee-action). Adjustable Timken Bearings throughout.

Huskiest transmission in any storage battery locomotive. Oil-tight; leakproof. Use regular auto oil; change every 6 months. Strong. Simple design. Low maintenance cost. Backed by over 25 years of experience with Storage Battery locomotives.

GREENSBURG "MONITOR"

Franklin County Coal Corporation at Royalton and Herrin, Illinois, have 12 of our Monitor type, storage battery locomotives.

All Greensburg Locomotives are CUSTOM-BUILT to your requirements

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the requirements of the user. Completely welded, instead of bolted as in past models, the new Chevrolet truck cab is said to be much stronger and its three-point type of suspension adds greatly to riding comfort.

•

Protective Coating

A new type of black, cold-applied protective coating with many unusual properties, known as Bituplastic, has been developed by the Wailes Dove-Hermiston Corp., a subsidiary of Koppers Company, Inc. Bituplastic is a dispersion in water of highly-refined plastic coal tar pitch and other materials. Because of its unusual composition it can be applied to damp surfaces whether metal, concrete or masonry.

Applied by brush or spray, Bituplastic dries quickly—in 15 minutes to two hours under average humidity and temperature conditions—and forms a tough film which is impervious to water, according to the manufacturer. Containing no volatile organic solvents or noxious fumes, it is virtually incombustible and is actually a fire retardant.

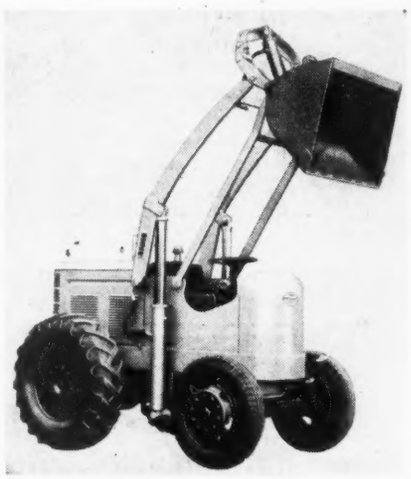
•

Shovel

The Frank G. Hough Co., Libertyville, Ill., has announced the Model HF Payloader, a ¾-yd. shovel.

In the Model HF, a four-speed fully reversible transmission provides practical forward digging speeds plus high reverse—maneuvering speeds, all quickly available with a minimum of shifting, according to the manufacturer. A single lever shifts gears into the desired speed range—thereafter the operator controls forward or reverse by merely flipping a directional lever. The bucket is raised, lowered, dumped and relatched by hydraulic power, controlled by a single lever. Bucket may be dumped completely or gradually at any height.

Full bucket capacity is assured and spillage of loose materials prevented by means of the automatic bucket tipback. A bulldozer blade, crane hook, cab and snow bucket are available.

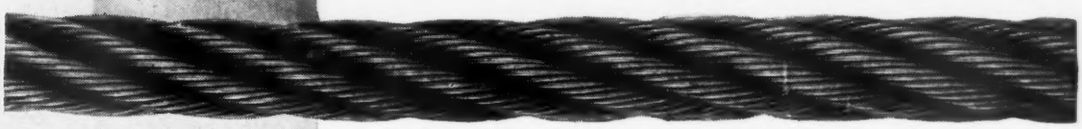


In Rope too—A Sound Heart Contributes to Longer Life

The quality of Wickwire Rope begins at the open hearth furnace where skilled metallurgists supervise the compounding of steel-making elements which give the finished product strength, stamina and toughness. Then, after the molten steel has taken form in ingot molds, the top of the steel block is discarded and only the sound heart of the ingot is used for rope wire.

From bloom -to billet -to rod -to wire -to finished rope, every step in the manufacture of Wickwire Rope is subject to our exacting controls. These controls, plus the service of distributors and Wickwire Rope engineers in all parts of the country, are your assurance of prompt service in solving your wire rope problems—are your assurance of quick delivery of the type of wire rope that will provide the utmost in performance, safety and long rope life.

Wickwire Rope is available in all sizes and constructions, both regular lay and WISSCOLAY *Pre*formed.



THIS 82-PAGE BOOK ON WIRE ROPE IS FREE—WRITE FOR YOUR COPY TODAY!

Thousands of wire rope users have found that the information packed in the pages of "Know Your Ropes" has made their work easier. It's full of suggestions on proper selection, application and usage of wire rope. It's easy-to-read and profusely illustrated. For your free copy, write—Wire Rope Sales Office, Wickwire Spencer Steel, Palmer, Massachusetts.

WICKWIRE ROPE

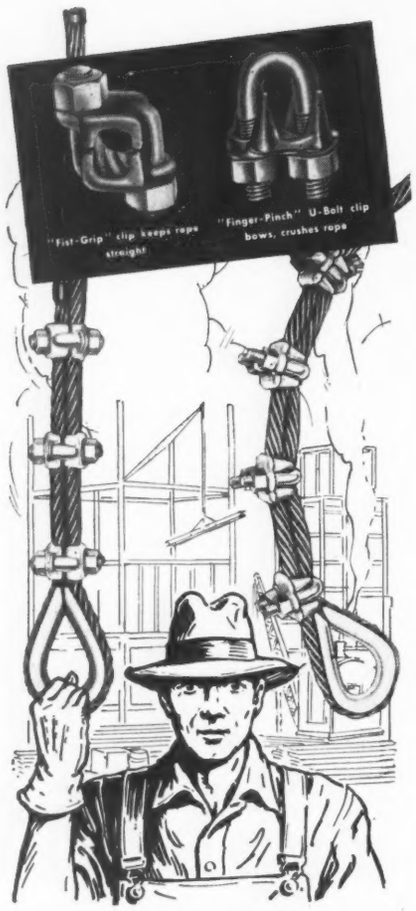
CF&I & SUBSIDIARIES

A PRODUCT OF WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass. **EXECUTIVE OFFICE**—500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES—Abilene (Tex.) • Boston • Buffalo • Chattanooga • Chicago • Denver • Detroit • Emlenton (Pa.) • Philadelphia • Tulsa • Fort Worth • Houston • New York

PACIFIC COAST—The California Wire Cloth Corporation, Oakland 6, California



"I'LL TAKE MINE STRAIGHT"

A *straight* rope is a *stronger* rope . . and for maximum strength, rope makers *insist* that kinking and crushing be eliminated. U-bolt clips *always* deform rope . . . particularly if they're "staggered". But LAUGHLIN "FIST-GRIP" CLIPS *insure* a straight rope because four flat bearing surfaces deliver uniform pressure over entire contact area . . . rope *stays* straight — no reverse bends under load.

"FIST-GRIPS" are foolproof . . . made in identical halves — can't be "staggered" . . . nuts on opposite sides for quick, easy wrenching . . . bolts and saddles drop-forged for strength and SAFETY. Look for LAUGHLIN'S "L" trade-mark at your supply house . . . write for catalog to Dept. 6, The Thomas Laughlin Co., Portland 6, Maine.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS

Tires

General Tire & Rubber Co. has resumed production of its premium C.D. truck line, which was discontinued during the war because of tire standardization. The improved methods of rubber compounding and tire construction developed during the war have been utilized in the building of the new C.D., according to the company, and the C.D. is available in all sizes from the C.D. 10, which replaces the 600-16 size, to the C.D. 52, which replaces the 11.0x24 highway.

Tread design and depth have not been changed in the new tire, the company states, but developments in rubber compounding makes the tread run longer, gives greater puncture and cut protection. Carcass of the tire, too, has been improved, it is said. Extra strength has been added to the body through new methods of construction and the use of cooler-running rayon cord fabrics. Originally designed for strenuous start-stop service, the General C.D. has proved equally adept for high-speed highway service, according to the company.

•

Printer-Developer

New and exlusive features of design which speed and facilitate print production are contained in the new Bruning Model 91 BW Volumatic Printer-Developer, according to the Charles Bruning Co., Inc., 4754 Montrose Ave., Chicago 41. Requiring only one operator, the new Volumatic is intended for large-volume production of cut sheets and accommodates roll stock up to 42 in. wide, printing and developing all Bruning BW mediums at speeds up to 30 ft. per minute. These include light, regular or card-weight BW paper prints with black or colored lines on white backgrounds; black or colored line paper prints on green-tinted backgrounds; transparent paper prints; cloth or film prints.

•

Grease Gun

Model 244 electric-motor-operated Lubrigun is the newest addition to the company's line of lubricating equipment, according to an announcement by the Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis 20, Mo. This high-pressure grease gun is a streamlined, portable unit equipped with a positive displacement pump, powered by a standard-make ¼-hp. universal motor for 110/115 volts a.c. or d.c., and it is said, provides rapid, positive delivery of all types of lubricants which readily seek their own level. The unit is mounted on two large rubber-tired casters and one ball-bearing swivel caster for maximum portability. Full lubricant pressure is instantly available. Capacity of lubricant container is 30 lb. and a 7-ft. high-pressure hose assembly with control valve and a 12-ft. electric plug-in cord are standard.

Steam Cleaner

A new Model JO Hypressure Jenny steam cleaner has been announced by the Homestead Valve Mfg. Co., Coraopolis, Pa. Mounted on large semi-steel wheels for maximum portability, the new machine operates at 80 to 120 lb. nominal operating pressure and 90 gal. per hour water capacity. When extra water capacity is required, an optional Adjusta-Blast Gun provides up to 480 gal. per hour. The machine is available with an oil or natural-gas burner.

The Model JO, according to the manufacturer, is self-starting and instant-steaming, and features economy of operation, a full-view control panel and complete accessibility to its parts.

•

Electrodes

Westinghouse Electric Corp., Pittsburgh 30, has announced two new electrodes. For welding low-alloy cast steel or low-alloy high-tensile-strength rolled steels in the flat position, with a.c. or d.c. straight polarity, the new DH-MO electrode is available in four diameters from 5/32 to ¼ in. It is said to be designed for high-speed welding of grooved joints, positioned fillets and horizontal fillets. Welds made with the DH-MO electrode meet the requirements of AWS-ASTM tentative specifications for Iron and Steel Arc-Welding Electrodes Classification E-7020.

For welding low-alloy cast steel or low-alloy high-tensile-strength rolled steels in all positions, with a.c. or d.c. reverse polarity, the new ACP-MO electrode is available in four diameters from 3/32- to 3/16-in. Although designed primarily for use with alternating-current, this electrode is said to be exceptionally effective when used with d.c. reverse polarity. ACP-MO should be used for vertical or overhead welding, according to the company, although it produces equally satisfactory results in making horizontal-fillet and flat-position welds. Welds made with this electrode meet the requirements of AWS-ASTM tentative specifications for Iron and Steel Arc Welding Electrodes Classification E-7011.

•

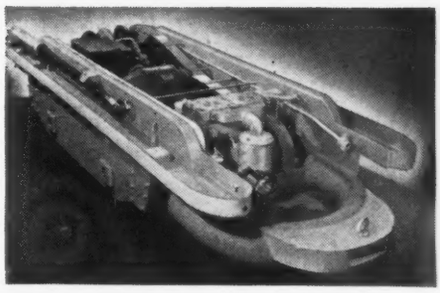
Electrode Holder

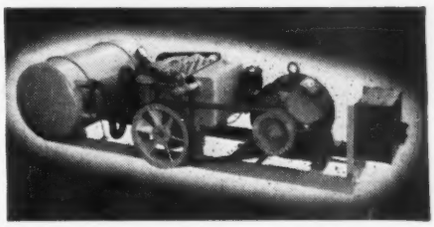
The A-316 Twecotong electrode holder, a new addition to its line of insulated tong-type electrode holders, has been announced by Tweco Products Co., Wichita, Kan. Its development is said to fill the requirements of the average job-shop or maintenance welder using 300-amp. welding equipment. The A-316 feature light weight, compactness and ease of operation with a 95-lb. bite on a 3/16-in. electrode. General specifications are: capacity, 1/16- through 3/16-in. electrodes; 250 amp.; weight, 18 oz.; length, 9 in.; palm span, 2¾ in.

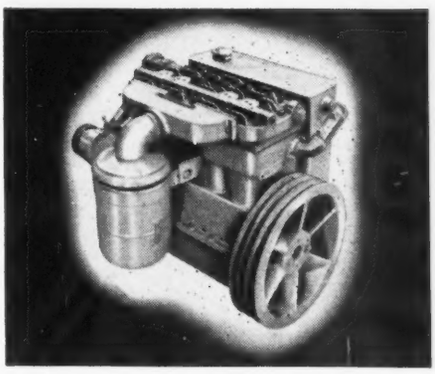
CANTRELL COMPRESSORS ARE BUILT BY MEN WHO KNOW COAL MINING!

Cantrell Air Compressors were developed by men who know the operating problems in mining and what it takes in an Air Compressor to do a satisfactory job. As a result, our complete, efficient machines have the enviable record of giving unquestioned satisfaction in hundreds of installations under the most adverse mining conditions. Of strong, simple construction, the type "MC," shown below, is always ready to deliver the same dependable, year in, year out service that has made the name Cantrell famous wherever compressors are used. The "MC" comes complete ready for operation, is transported either in a train of cars or by locomotive.

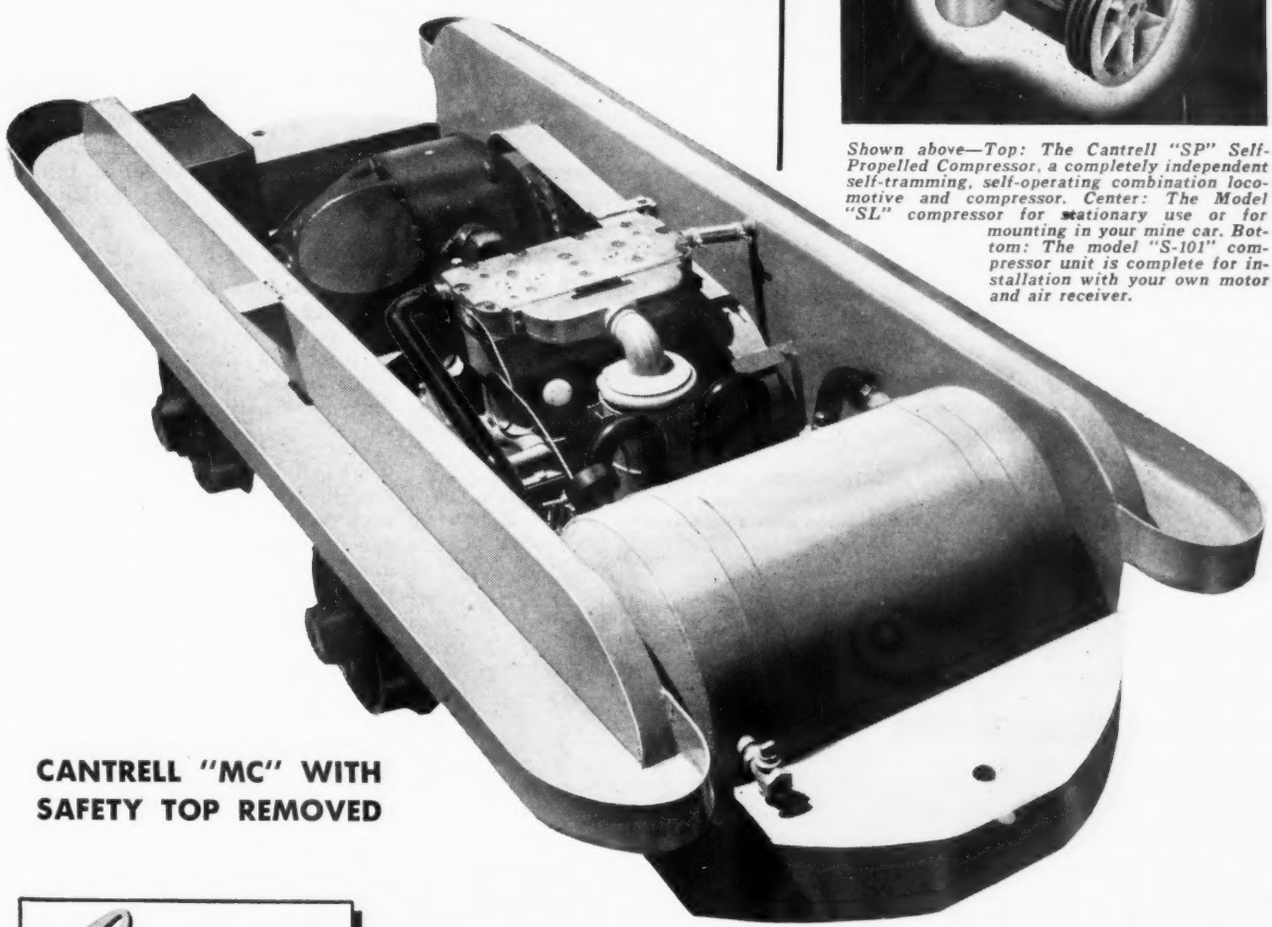
Imperial-Cantrell builds a compressor for every requirement of track, trackless or stationary use. Write today for information on the complete line of Cantrell Compressors.







Shown above—Top: The Cantrell "SP" Self-Propelled Compressor, a completely independent self-tramming, self-operating combination locomotive and compressor. Center: The Model "SL" compressor for stationary use or for mounting in your mine car. Bottom: The model "S-101" compressor unit is complete for installation with your own motor and air receiver.



CANTRELL "MC" WITH SAFETY TOP REMOVED

Cantrell COMPRESSORS

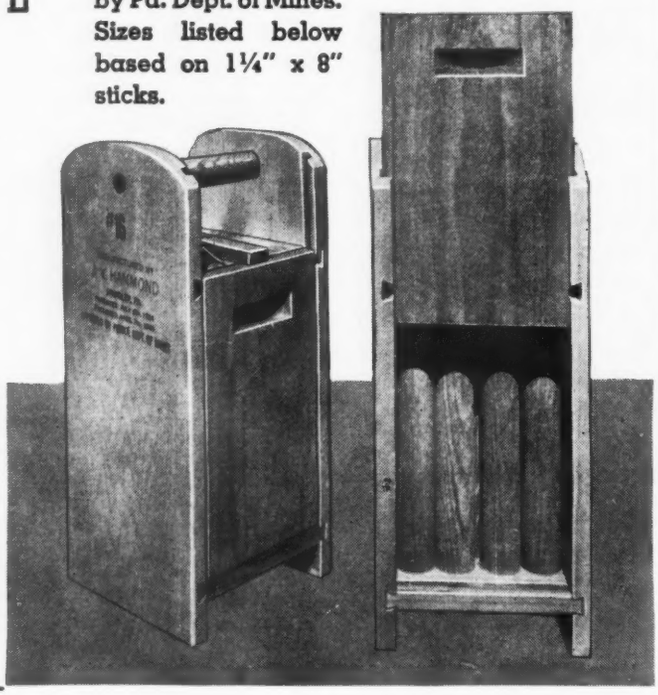
IMPERIAL-CANTRELL Mfg. Co.

JELLICO TENNESSEE

SAFETY EXPLOSIVE BOXES ...latest type-all wood

HAMMOND Explosive Boxes are made entirely of wood—have no metal parts. Featured is tongue-grooved and dovetailed construction. Automatic lock uses a rubber band. Approved by Pa. Dept. of Mines.

Sizes listed below based on 1¼" x 8" sticks.



Boxes Made In These Sizes:

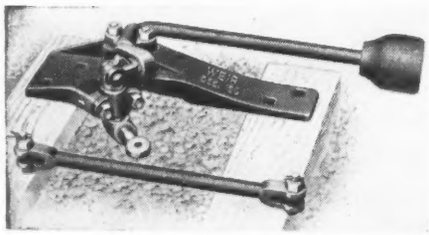
No. 9 Powder Box, 9 stick size...$1.35
No. 12 Powder Box, 16 stick size..$1.85
No. 16 Powder Box, 16 stick size..$1.60
No. 20 Powder Box, 20 stick size..$2.10
No. 36 Powder Box, 36 stick size..$3.60
No. 50 Powder Box, 50 stick size..$4.40
No. 72 Powder Box, 72 stick size..$5.20
No. 6 Detonator Box, 2½x3x6 inside $1.20
No. 8 Detonator Box, 2x2½x8 inside $1.20

Special Sizes Made to Order
Patented July 8, 1924.
Patented Apr. 7, 1942

J. V. HAMMOND CO. SPANGLER, PA.

SWITCH STANDS that CONSISTENTLY Prove Their Value in moving MORE COAL...FASTER

WEIR KILBY

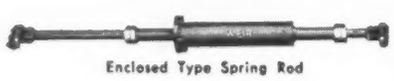


Design 25—Parallel Throw

Design 25—An improved Parallel Throw Stand of simple construction and easy operation. The stand is low to give maximum clearance; parts are interchangeable and easily replaced. Adjusting arm permits easy change of throw from 3" to 5".

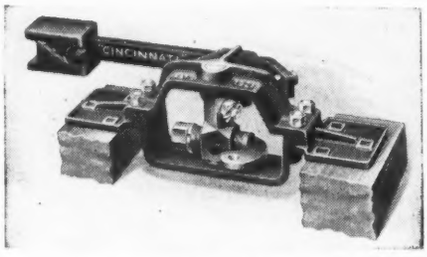
CHAMPION—Self-locking and non-automatic. The throw is adjustable by means of transferable shims which allow a variation of ⅛" and a range of 1".

Open Type Spring Rod



Enclosed Type Spring Rod

These switch stands furnished with either solid or spring connecting rods.



CHAMPION Parallel Throw

CATALOG "H" comprises 154 pages of helpful data, replete with photos, drawings and specifications, covers every track work need. A request on your letterhead will bring your copy promptly.

Suppliers to Mines and Railroads Since 1882

WEIR KILBY CORPORATION
CINCINNATI 12, O. BIRMINGHAM 7, ALA.

Trade Literature

Available Without Charge on Request to the Manufacturer

Dryer/Cooler—Link-Belt Co., Dryer Division, 300 West Pershing Rd., Chicago 9. Booklet No. 2009 contains installation views, typical layouts, and dimensions of ten standard sizes of Link-Belt Multi-Louvre dryer/cooler units now available.

Graders—Caterpillar Tractor Co., Peoria 8, Ill. Two new folders, Form No. 10184 and Form No. 10186, describe the new Caterpillar diesel No. 12 and No. 112 motor graders, respectively. Construction and operational features of the new machines are covered, along with illustration and brief specifications.

Drilling and Cutting Bits—Kennametal, Inc., Latrode, Pa. Catalog No. M-3 lists an expanded line of Kennametal-tipped mining tools and includes specifications and prices for rotary drill bits for blast-hole drilling in underground and surface mines, eight styles of standard and heavy duty cutting-machine bits, plug and core bits, augers and auger accessories and percussion rock bits.

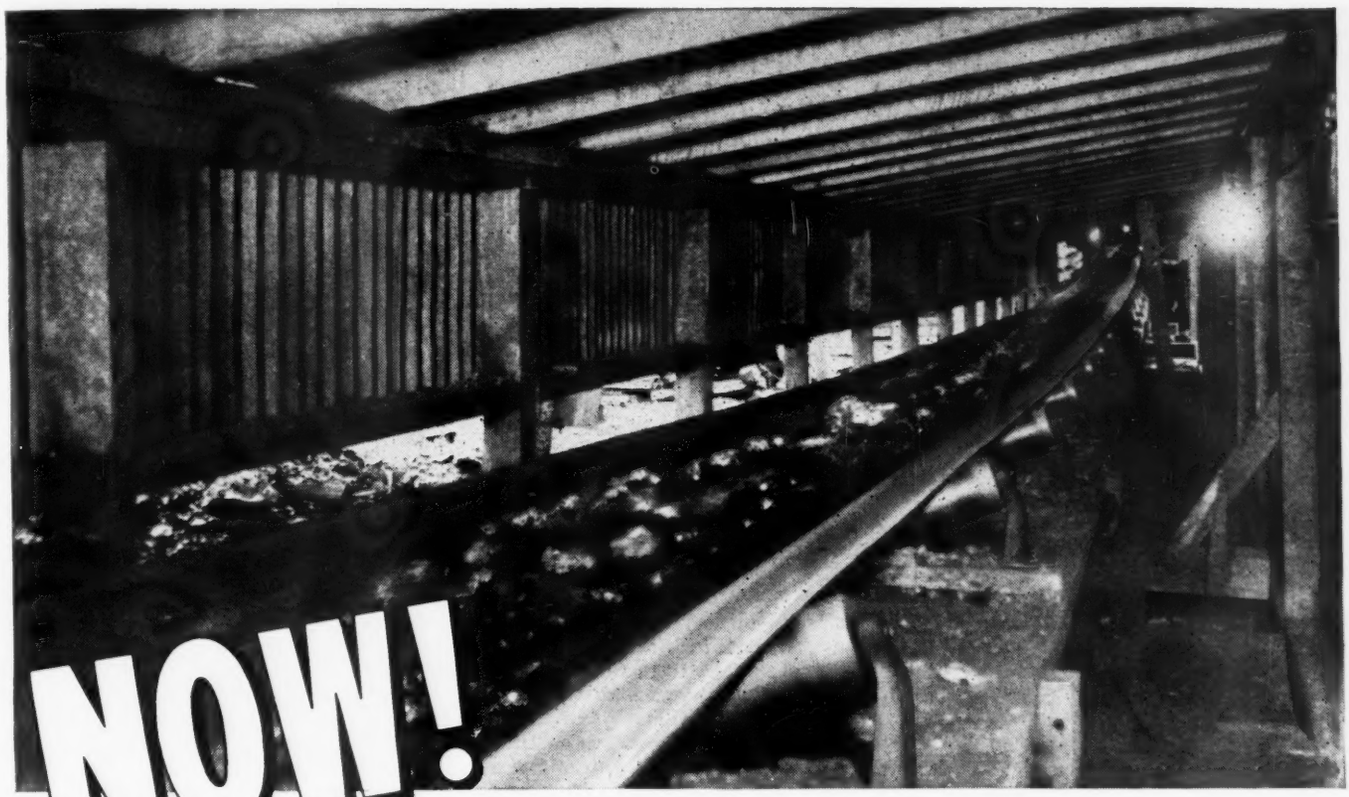
Dragline Buckets—Page Engineering Co., Clearing Post Office, Chicago 38. Booklet, "How to Get the Most Out of a Page Automatic Dragline Bucket," contains detailed information on selection, construction, operation and maintenance of the Page bucket.

Rubber Transmission Belts—B. F. Goodrich Co., Akron, Ohio. Catalog section, "Selection and Maintenance of Rubber Transmission Belts," is a guide to the application and care of flat rubber belting.

Slurry Pump—Morris Machine Works, Baldwinsville, N. Y. Bulletin describes the Type R slurry pump, with details of features, construction and operation, and contains performance charts for pumping any one of three basic types of slurries, each containing a different percentage of solids.

Dewatering Screen—Robins Conveyors Division, Hewitt-Robins, Inc., 270 Passaic Ave., Passaic, N. J. Bulletin No. 129 describes and illustrates the Robins Eliptex Dewaterizer, with facts and case histories demonstrating its ability to remove surface moisture from coal and other materials in sizes as small as ⅛x0-in.

Earthmover—R. G. LeTourneau, Inc., Peoria, Ill. Folders Nos. TP-136, TP-138 and TP-134 explain in detail and picture the many new design features built into the new self-loading D Tournapull. Photographs show appreciations on small yardage projects and complete specifications



NOW!

Move coal out of your mine faster!

You can move coal out faster—and at less cost per ton—with the Robins Mine Conveyor.

Naturally you will agree that present costs must be reduced. That's why mine mechanization is essential. And why cost-minded operators are turning to the Robins Mine Conveyor.

This time-proved method of moving coal out of mines enables you to reduce your cost per ton and increase output per man. Yet your original investment is moderate!

Original installation can be made in an entry quickly. Conveyer sections are simply dropped into place. Additional sections can be added to follow the face as required—*without tools, track, trolley or trouble.*

It's strong, sturdy, substantial—economical to use down in the entries, sufficiently rugged to use as a "mother." Drop-in construction enables it to follow the contour of uneven mine floors. Low height enables it to follow the seam.

You can get single or tandem drive. You can have tail or internal takeup. And you are offered demountable sections (they come into your mine knocked-down, yet are perfectly rigid when assembled).

More than that, the conveyor is equipped with Ajax Conveyor Belting, made by Hewitt to provide long, dependable service.

In short, Hewitt-Robins stands back of both conveyor and belting . . . is the only organization able to take complete responsibility for *both* your mine conveyor and its belting.

Get the full facts about the Robins Mine Conveyor—now! Find out how you can move coal out of your mine faster...and at less cost per ton. Write Robins Conveyors Division, Passaic, N. J.

COMPARE THESE EXCLUSIVE ROBINS ADVANTAGES WITH ANY OTHER MINE CONVEYOR

1. **REQUIRES LESS HEAD ROOM.** Only 15" to belt line on intermediate and tail sections.
2. **YOUR CHOICE OF TAKEUPS.** Tail or intermediate types. In three widths—26", 30" or 36", in lengths up to 3,000 feet.
3. **YOUR CHOICE OF SECTION LENGTHS.** Either 8- or 10-foot sections, whichever is best suited to your needs. 10-foot length means fewer idlers, less cost.
4. **SIMPLIFIED LUBRICATION.** Equipped with famous Robins Idlers—with exclusive, patented One-Shot lubrication. Lubricated from one side only . . . and from *either* side.
5. **SINGLE RESPONSIBILITY.** One company takes complete responsibility for both elements—conveyor *and* belting.

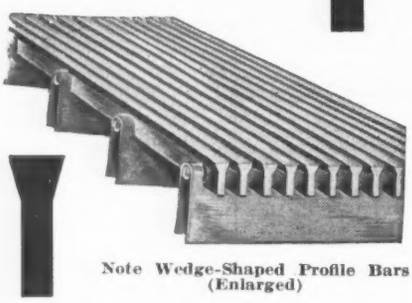
HEWITT-ROBINS INCORPORATED

ROBINS MINE CONVEYOR

ROBINS CONVEYORS DIVISION
HEWITT-ROBINS INCORPORATED
PASSAIC, NEW JERSEY

continuous open slots

THE WEDGE-BAR SCREEN



Note Wedge-Shaped Profile Bars (Enlarged)

NO UNPERFORATED AREA
NO BLINDING OR PACKING

The Wedge-Bar Screen has two distinctive features:

1—**Continuous open slots over *entire* Screen surface.**

2—***Downward*** **enlargement of slots rapidly draws off moisture and fines because of the wedge-shape-profile bars.**

moisture, undersize clear quickly!

U-holder supports have maximum carrying capacity and rigidity, with minimum weight.

Wedge-Bar Sections are designed and fabricated to fit your equipment, do your job most efficiently. Send for data sheets, fill them out, and without obligation on your part we will make recommendations. Illustrated catalog promptly upon request.

Shaker Jackets • Vibrating Screen Panels • Chutes • Conveyors • Dryers

WEDGE-BAR SCREEN CORP.
640 W. 134 ST., NEW YORK 31, N. Y.

on the one-man-operated rig are included.

Power-Shovel Dippers; Shovel and Dragline Parts—American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill. Bulletin 547-DS contains complete, detailed descriptions of all Amsco dippers. A section is devoted to a comprehensive discussion of austenitic manganese steel and its unusual properties for dippers, power-shovel and dragline machine parts.

Drilling Machines—Salem Tool Co., Salem, Ohio. Booklet contains complete descriptions and illustrations of the McCarthy earth- and rock-boring machines in action, both horizontal and vertical types, and points out the features and advantages of the self-propelled, truck-mounted and trench-type units.

Pumps—American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill. Bulletin No. 547-IP describes the construction features and applications of Amsco-Nagle, ball-bearing, Type T industrial pumps. Sizes and specifications are included for Type T, which is featured for applications such as sludge or slurry handling, gritty water, or ash handling.

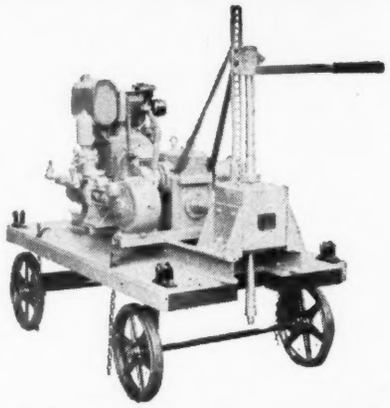
Rock Dust—Columbia Quarry Co., St. Louis 1, Mo. Folder, "Rock Dust for Coal Mines," outlines desirable properties of rock dust for coal-mine use and describes physical and chemical characteristics of Columbia rock dusts.

Power Transmission—American Pulley Co., Philadelphia 29, Pa. Bulletin on Speed-Jack drives features easy-to-use drive tables and charts for selection of proper-sized sheaves for the desired range of speed on machinery drives operating up to 1 hp. The speeds covered range from as low as 109 r.p.m. to as high as 2949 r.p.m. Construction details and suggested applications for American Speed-Jack drives are included.

Electric Motors—Electric Machinery Mfg. Co., Minneapolis 13, Minn. Latest issue of "The E-M Synchronizer" contains articles, "External Motor Protection Pays" (for large industrial drives) and "How to Figure Voltage Drop" (particularly in motor starting). Protective arrangements for motors are defined and are illustrated with diagrams and photographs. Wall chart No. 4695 shows cutaway view of two-pole squirrel-cage induction motor in ratings of 200 to 700 hp., with the major features explained in detail.

Lubrication—Freedom-Valvoline Oil Co., Dept. 112, Freedom, Pa. Pamphlet written by the Lubrication Committee, American Petroleum Institute, discussing the practice of buying lubricants by specification as against

CORE DRILLS



- **Accurate cores of coal seams by using single or double tube core barrels.**
- **Ideal for determining overburden before strip mining.**
- **Diamond—alloy or steel shot bits.**
- **Light weight — easy to move in rough country.**

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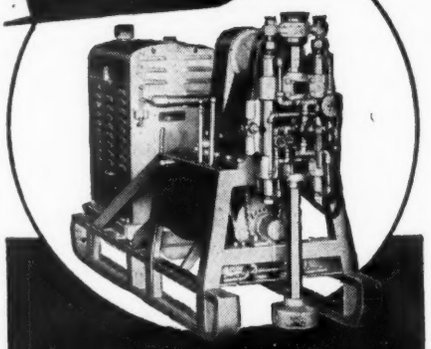
ACKER DRILL CO.
SCRANTON 3, PA.

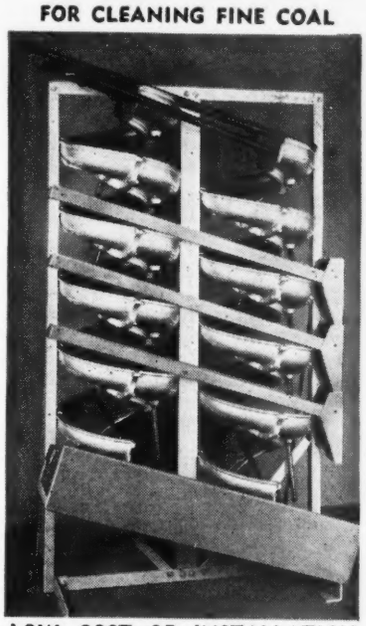
Diamond Core Drilling
CONTRACTORS



Testing mineral properties with our light gasoline drills. SATISFACTORY COAL CORES GUARANTEED. Ground solidification by our pre-pressure grouting method for shafts. Wet mine areas, horizontal holes for drainage. Electric drills for inside mine drilling.

MOTT CORE DRILLING CO.
HUNTINGTON • WEST VIRGINIA

HUMPHREYS
SPIRAL CONCENTRATOR
FOR CLEANING FINE COAL



LOW COST OF INSTALLATION
NO MOVING PARTS
LOW OPERATING COST

Engineering Division
The Humphreys Investment Co.
First National Bank Building
DENVER 2, COLORADO

PRESSURE CONCRETE
(GUNITE SYSTEM)
by HUDSON RUMSEY CO., INC.

For
Repairs & Construction of
● MINE TUNNELS
● BUILDINGS
● BRIDGES
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● TANKS
● COAL BUNKERS
● WALLS
● DAMS

HUDSON RUMSEY CO. INC.
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buying by brand name, available by permission of the American Petroleum Institute.

Couplings—Thomas Flexible Coupling Co., Warren, Pa. Separate catalog sheets contain specifications, horsepower ratings, etc., of Type BM floating-shaft couplings and Type MT double-engagement coupling.

Bulldozers — Caterpillar Tractor Co., Peoria 8, Ill. Form No. 10225 covers the three sizes of Caterpillar straight-blade, cable-controlled bulldozers—the No. 8S, the No. 7S and the No. 6S. Structural and operational features of the bulldozer units, used with Caterpillar diesel D8, D7 and D6 track-type tractors, are described, along with application illustration.

Flux-Injection Cutting Process—Air Reduction Sales Co., 60 East 42nd St., New York 17. Reprint of an article entitled "Flux-Injection Cutting of Stainless Steels" covers the fundamentals, capacities and advantages of the revolutionary flux-injection method.

Plastics—Plastics Division, General Electric Co., Pittsfield, Mass. Booklet contains complete information on the manufacture, application engineering and properties of all types of Textolite laminated plastics. It lists 44 different grades of the sheet material, information on Textolite tubes and rods and many other applications.

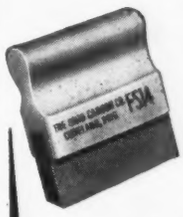
●

Industrial Notes

Joy Mfg. Co., Pittsburgh, Pa., has named E. M. Platts vice president in charge of sales for all Joy products. Mr. Platts has been active in the mining industry for the past 30 years and was one of the principal incorporators of the La-Del Conveyor & Mfg. Co. and head of its sales force since its inception. When La-Del became a division of Joy, Mr. Platts moved over as vice president in charge of coal-mining sales. In his new position, Mr. Platts will supervise sales of all equipment produced by the Joy, Sullivan and La-Del Divisions for metal, non-metallic and coal mining and other fields.

Gould Storage Battery Corp., Division of National Battery Corp., St. Paul, Minn., has announced acquisition of the entire business and plant facilities of the Storage Battery Division of Philco Corp. and their consolidation with the Gould Storage Battery Corp. to form one of the largest industrial and automobile replacement storage battery companies in the United States. M. W. Heinritz, vice president in charge of the Storage Battery Division of Philco, has been appointed vice president in charge of the Trenton Division of the

OHIO Burnishing TOOLS
GUARANTEE
GOOD MOTOR
HOUSEKEEPING
THEY KEEP
COMMUTATORS
"SPIC'N SPAN"



During normal operation, under certain conditions and often caused by improper brush application, a high resistance film forms on commutation and ring surfaces. This film is detrimental to the efficient operation of motors and generators. OHIO Burnishing Tools remove this film and leave a commutator or ring surface clean and glass smooth. There is a style and size of tool for every purpose and for motors from flea to heavy duty horse power. Sold under guarantee of absolute satisfaction.

THESE TOOLS ARE APPLIED WHILE THE MOTOR IS IN OPERATION

BUY YOUR CARBON BRUSHES FROM A SINGLE SOURCE

THE OHIO CARBON COMPANY
12508 BEREA ROAD
CLEVELAND 11, OHIO

RUGGED MOISTURE-RESISTANT

SLUSHER BLOCKS

Check V THESE FEATURES

- **TIMKEN ROLLER BEARINGS** for free running and long life under mining conditions.
- **MANGANESE STEEL SHEAVES** for maximum strength and minimum weight.
- **ANNEALED CAST STEEL SIDES**
- **ALLOY STEEL** heat-treated fittings which eliminate any chance of a "weakest link."
- **ANTI-FOULING CONSTRUCTION** with fully recessed sheaves.
- **SKOOKUM BROAD THROAT** construction to allow the passage of splices or fittings.

For the last word in engineered Slusher Blocks, Write for Our Catalog

SKOOKUM COMPANY, Inc.
8504 N. CRAWFORD ST.
PORTLAND 3, OREGON

Gould Storage Battery Corp.

McNally Pittsburgh Mfg. Corp., Pittsburg, Kan., has elected W. S. McAleer, Pittsburgh, Pa., a vice-president of the organization. He will maintain headquarters in Pittsburgh as manager of the Eastern district of the company. Mr. McAleer, who has been associated with the coal and coke industry for the past 25 years, joined the company in 1941 as manager of the Pittsburgh office.

Chesapeake & Ohio Ry., Cleveland, Ohio, has named Charles E. Lawall, formerly engineer of coal properties, assistant vice president, with headquarters at Huntington, W. Va., succeeding Ira F. Davis, retired.

Cummins Engine Co., Inc., Columbus, Ind., has appointed D. J. Cummins manager of engineering and quality, and he will assume most of the duties relinquished by H. L. Knudsen. W. J. Manning has been named assistant controller.

Pennsylvania Rubber Co., Jeanette, Pa., has appointed Edwin V. Duffy and Opha Lee Rogers assistant sales managers. Mr. Duffy was formerly the Pennsyvania service manager and Mr. Rogers had served on the sales force of the Pittsburgh branch zone. R. J. Scott has been promoted to service manager.

Goodyear Tire & Rubber Co., Akron, Ohio, has named O. A. Schilling eastern sales manager of its mechanical goods division, succeeding H. D. Foster, recently appointed manager of the division. Mr. Schilling has been district manager of mechanical goods at Dallas, Tex., since 1941.

Hendrick Mfg. Co., Carbondale, Pa., has appointed H. H. Buckley as Pittsburgh district manager, succeeding Bruce G. Shotton, deceased. Mr. Buckley was previously associated for a number of years with Heyl & Patterson, Inc.

U. S. Machine Corp., Lebanon, Ind., has announced that the Champion Coal Co., an affiliate of Consolidation Coal Co., has accepted a franchise to sell and install Winkler domestic, commercial and industrial stokers in the Pittsburgh area. Champion has created a stoker retail division in its Pittsburgh offices.

American Car & Foundry Co., New York, has elected Rudolph Furrer vice president in charge of engineering. Mr. Furrer is internationally known as a research and development engineer, having served on the War Metallurgy Committee and as a special consultant in Ordnance research and development.

The Okonite Co., Passaic, N. J., has recently established a new sales office at 626 Broadway, Cincinnati, Ohio, in charge of S. W. Pollock, who will handle the sales of Okonite, Hazard and Okonite-Callender products in southern Ohio.

FOR SAFETY'S SAKE, SUPERIOR COUPLINGS

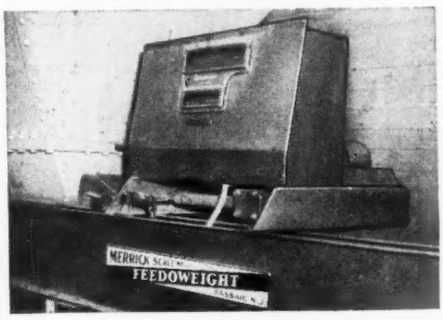
Drop Forged Links

Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

DROP FORGED SWIVEL COUPLINGS

PITTSBURGH KNIFE & FORGE CO.

1421 Reedsdale St., N.S.
Pittsburgh 12, Pa.



THE MERRICK

FEEDOWEIGHT

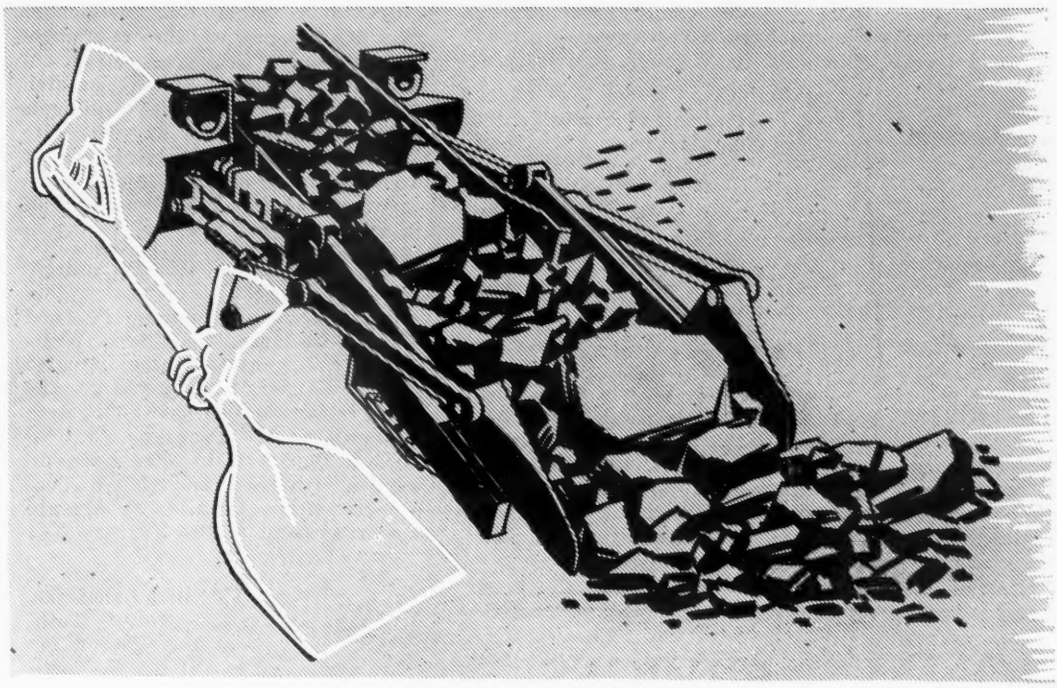
Reg. U. S. Pat. Off.

tells rate per hour —weight per day

A self-contained automatic conveyor scale, combined with automatic gate to give feed rate control. Powered feed regulator operates gate, without restraint on scale beam. Feed rate may be varied. Large feed opening insures even flow. Uniformly feeds bulk material BY WEIGHT; and automatically totalizes weight of materials fed. Durable. Simple to operate. Rugged, heavy duty design. Slow moving parts means long life. Easy to install and maintain.

Manufacturers of
The Merrick WEIGHTOMETER, which weighs any material carried on a belt conveyor without interrupting conveying operation. Complete descriptive matter on request.

MERRICK SCALE MFG. CO.
Engineers and Mfrs. of Automatic Weighing Equipment
PASSAIC, N. J., U. S. A.



For Complete Service, Choose the Shovel Action "Automat"

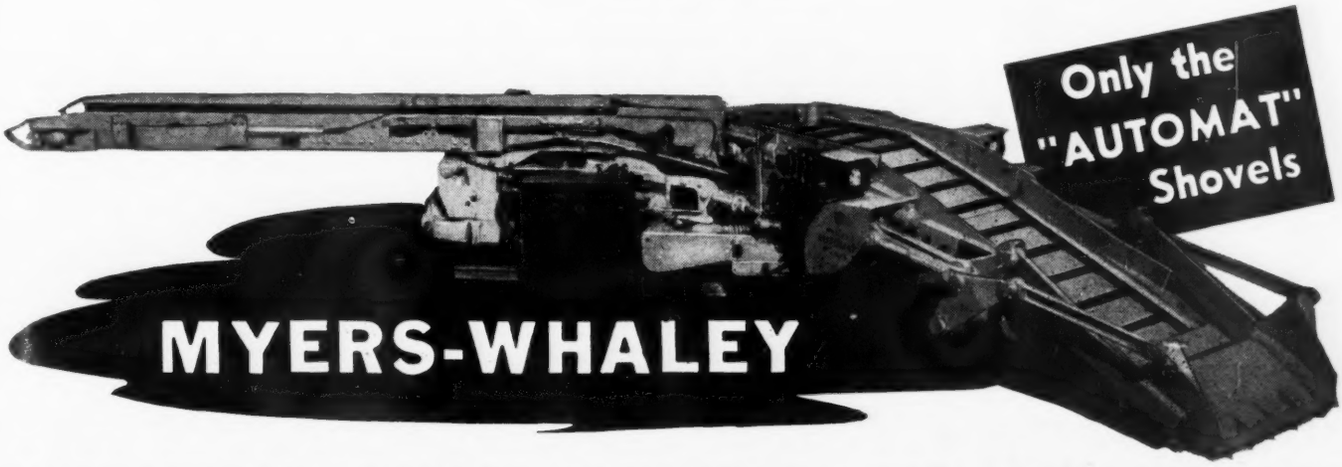
For complete loading service in coal, rock or slate, you can't beat the natural shovel action of the Whaley "Automat". Wherever there's loading to be done, the "Automat" handles, in its stride, any lump of coal that will pass through your tipple, or any lump of rock your cars, aerial tram or larries can take.

Having a smooth, swift shovel action, the "Automat" lifts and loads at the rate of 45 to 48 strokes per minute, never failing to clean up quickly, completely and without taking bottom if pavement is soft. With its continuous shovel action, the "Automat" has a rated capacity of 7 tons a minute—easily averages 3 tons per minute.

For complete service, in addition to loading coal, the "Automat" is very effective and efficient in the brushing of entries in thin seams, cleaning up air courses, reopening old workings and making grades.

For complete service, choose the shovel action "Automat". Myers-Whaley Co., Knoxville, Tenn.

Wm. Neill & Son, Ltd., St. Helen's Junction, Lancashire, England, are licensed for Manufacture and Sale in Great Britain and Europe.



MECHANICAL LOADERS EXCLUSIVELY FOR OVER 39 YEARS

U. S. Rubber Co., New York, has named Richard B. Carland sales promotion manager of its wire and cable department. Mr. Carland was formerly in the sales-promotion department of the company's mechanical goods division.

Buda Co., Harvey, Ill., has appointed Fred W. Sparks district representative to handle the Ohio territory for its engine division. Mr. Sparks was formerly with the Euclid Road Machinery Co., and also with the Cummins Engine Co.

Kennametal, Inc., Latrobe, Pa., has appointed Charles L. Copley as a mining engineer serving mines in West Virginia and Robert T. Smith as a mining engineer serving the mines of Ohio. Kennametal also has named Laurent Industrial Development Co., New York, as exclusive sales representative for Kennametal mining tools in Continental France, French Empire, French Protectorates, French Mandates, Saar, Spain, and Italy.

Link-Belt Co., Chicago, has elected Harold L. Hoefman vice president in charge of manufacturing. Mr. Hoefman, who has been general manager of the company's Pershing Road plant, Chicago, since 1943, entered the employ of this plant in 1920 as a draftsman. David E. Davidson, formerly head of the plant's engineering department, has been appointed general manager of the Pershing Road plant, to succeed Mr. Hoefman.

Fulton Bag & Cotton Mills, Inc., New York, has elected three new members to the board of directors, as follows: George L. Brogdon, company controller; Julius B. Cronheim, manager of the St. Louis plant; and Adolph Mayer, manager of the Dallas, Tex., plant.

Bethlehem Steel Co., Bethlehem, Pa., has announced the retirement of Raymond L. Gillispie, consultant to its rail and track accessories division, sales department. Mr. Gillispie has been connected for 37 years with the manufacture and sale of railway products and from 1934 until February of this year was sales manager of the division.

Koppers Company, Inc., Pittsburgh, has announced that the Pennsylvania Coal Products Co., Petrolia, Pa., and Wailes-Dove-Hermiston Corp., Westfield, N. J., have become integral parts of Koppers Company, Inc. The Pennsylvania Coal Products Co., is to be known as the Pennsylvania Coal Products Department of the Koppers' Chemical Division, and the Wailes-Dove-Hermiston Corp. is to operate as a department of the Koppers' Tar Products Division.

R. H. Sheppard Co., Inc., Lancaster, Pa., has appointed George Toth, formerly district sales engineer for the Socony Vacuum Oil Co. in North and South Carolina, to the southern sales territory formerly covered by Ed MacFarland, who will be transferred to the Eastern and New England area.

Bethlehem Steel Co., Bethlehem, Pa., has announced the following changes in sales personnel: J. M. Ellis, general manager of sales since 1936, has been named assistant to the vice president. K. L. Griffith, assistant general manager of sales since 1938, has been appointed general manager of sales. D. C. Roscoe, manager of sales, sheets and strip, has been appointed assistant general manager of sales, and is succeeded by A. T. Hunt, formerly manager of sales, galvanized sheets and formed products. M. C. Schrader, assistant to the general manager of sales, has been appointed assistant to the vice president.

SKF Industries, Inc., Philadelphia, has announced plans for a two-year modernization and expansion program totalling more than $4,000,000, to equip its two Philadelphia plants with new machinery capable in some instances of operating from two to six times faster than standardized equipment long used in the anti-friction bearing industry. While the bulk of the expenditures will go for new machinery required in the production of anti-friction bearings, the program is aimed primarily at stepping up production of spherical roller bearings, the company states. The company's metal-stamping and cast-iron departments were to be transferred beginning July 15 to newly acquired plants at Shippensburg, Pa., and Hornell, N. Y., to clear space in the main plants.

Simplex Wire & Cable Co., Cambridge, Mass., has appointed Conrad W. Neely, Mt. Hope, W. Va., as a sales representative.

PROFESSIONAL SERVICES

ALLEN & GARCIA CO.
ENGINEERS AND BUILDERS OF MODERN COAL OPERATION
Authoritative Valuations, and Reports of Mining Properties Equipment and Operation.
332 S. Michigan Ave., Chicago
120 Wall Street, New York, N. Y.

BURRILL and GWIN
Power Plant and Transmission Lines
Mine Ventilation, Haulage and Drainage Systems
Sewage Disposal and Water Supply
Industrial Plants, Surveys, Reports
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F. CARL COLCORD
Consulting Engineer
COAL LAND VALUATIONS
MINE INSTALLATIONS AND OPERATION
1132 Union Trust Bldg., Cincinnati, Ohio, Phone Cherry 5403
Box 268, Paris, Ky., Phone 648

EAVENSON & AUCHMUTY
Mining Engineers
COAL OPERATION CONSULTANTS VALUATION
2720 Koppers Bldg. — Pittsburgh 19, Pa.

HENRY O. ERB
Coal Preparation Consultant
PLANT DESIGN AND OPERATION
1018 So. 8th St. — Terre-Haute, Ind.

J. H. FLETCHER
39 Years
Continuous Consulting Service to Coal Mines
Telephone Harrison 5151
McCormick Building — Chicago, Illinois

LANCASTER, ALLWINE & ROMMEL
Registered Patent Attorneys
Patent and Trade-Mark Practice before U. S. Patent Office. Validity and infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request.
Suite 416, 815—15th St., N.W., Washington 5, D. C.

HERBERT S. LITTLEWOOD
CONSULTING ENGINEER
Application - Supervision of Installation
Maintenance - Inspection - Testing
POWER-HAULAGE-HOISTING-VENTILATION
211 Carnegie Place — Pittsburgh 8, Pa.

C. C. MORFIT & ASSOCIATES
Consulting Engineers
11 Broadway, New York 5, N. Y.
Cable Address Mandsmetal, New York

SHERWIN and JANVRIN
Mining Engineers
Pineville, Ky.
Reports on COAL PROPERTIES
Planning, Construction & Supervision

TEMPLETON-MATTHEWS CORPORATION
Designing Engineers—Consultants—Builders
MODERN COAL PREPARATION PLANTS THRU "CO-OPERATIVE ENGINEERING"
905-06 Sycamore Bldg. — Terre Haute, Indiana

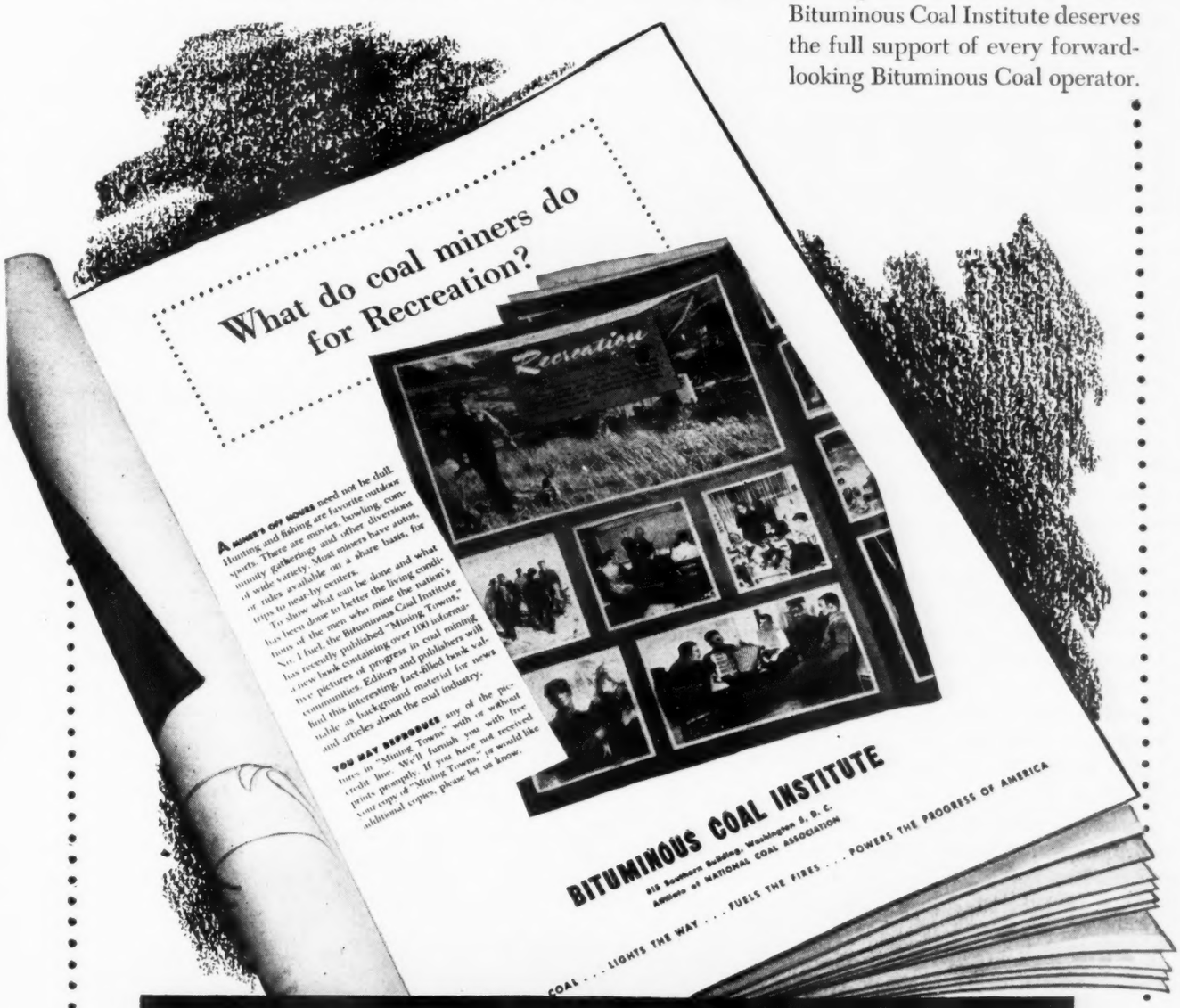
L. E. YOUNG
Consulting Engineers
MINE MECHANIZATION
MINE MANAGEMENT
Oliver Building—Pittsburgh, Pa.

PICTURES FOR THE PAPERS!

● How workers and operators in the coal industry are meeting the problems of housing, sanitation, recreation, and other aspects of community living is of great interest to editors and writers on whom the public depends for information.

To help these important people get a true picture of conditions in our industry, the Bituminous Coal Institute presents candid messages in advertisements like the one below. Appearing in leading magazines that reach most of the nation's editors and publishers, these advertisements help to promote a clearer understanding of improvements attained in the living conditions of coal miners in the United States.

This strategically aimed campaign is but one of the many public relations activities conducted by the Bituminous Coal Institute for the benefit of our industry. With three years of accomplishment behind it, and with plans for an active future, Bituminous Coal Institute deserves the full support of every forward-looking Bituminous Coal operator.


What do coal miners do for Recreation?
Recreation
BITUMINOUS COAL INSTITUTE
Washington, D. C.
Affiliate of NATIONAL COAL ASSOCIATION
BITUMINOUS COAL . . . LIGHTS THE WAY . . . FUELS THE FIRES . . . POWERS THE PROGRESS OF AMERICA

BITUMINOUS COAL INSTITUTE
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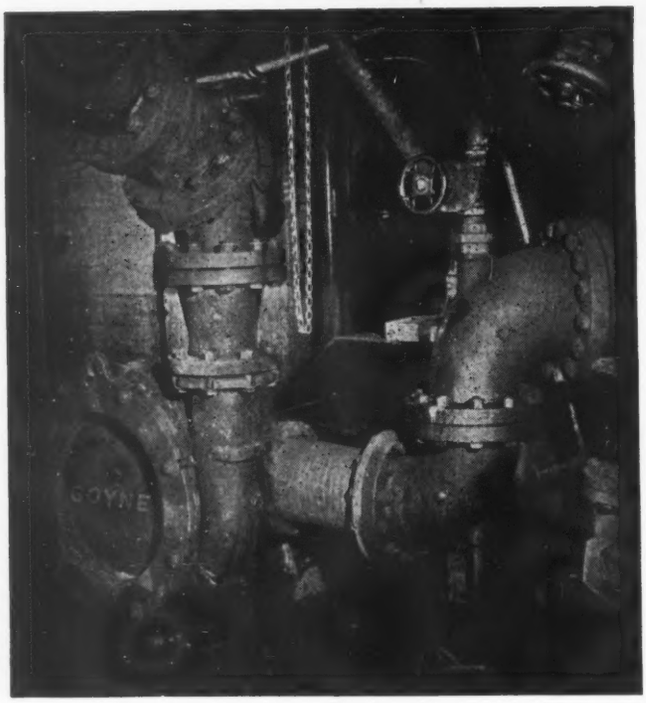
GOYNE PROCESS PUMPS



A Sand Pump is only a link in a chain in a coal washing plant, but it can be a strong link if it embodies the following features as does the Goyne.

1. Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing only the rear head of the pump. No suction or discharge piping is disturbed.

2. The one packing box of the pump subjected only to suction pressure and is readily kept clean by a low pressure clear water line. Long packing and shaft sleeve life is assured.

3. Impeller clearance is adjusted *while the pump is running*, insuring constant pump capacity so essential for uniform washing.

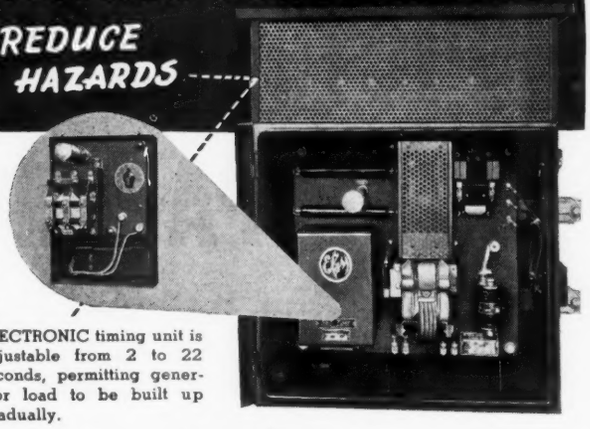
4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.

5. We carry the spare parts stock. Order your replacements when needed. Reduce your inventory by using Goyne Process Pumps.

All inquiries receive prompt and careful attention.

THE GOYNE STEAM PUMP CO.
ASHLAND, PA.

Protected Power Circuits
REDUCE HAZARDS



ELECTRONIC timing unit is adjustable from 2 to 22 seconds, permitting generator load to be built up gradually.

WITH EC&M *LINE-ARC* SECTIONALIZERS

WHEN a fault occurs, the EC&M Form XLP Sectionalizers lock out until the line shows "clear." And only a small current is required by the load-measuring (feeler) circuit, because the closing-relay operates electronically.

The ability to adjust overcurrent relays on these Sectionalizers to the needs of small sections minimizes the tripping of main circuit breakers, disconnects power if a roof falls thereby reducing the danger of fire and also, safeguards machines in the section.

EC&M Sectionalizers are built in several sizes for protecting mine power circuits.

Write for Bulletin 1400

THE ELECTRIC CONTROLLER & MFG. CO.
2698 East 79th Street Cleveland 4, Ohio

KEEP YOUR BELTS RUNNING

1. Inspect your belts and fastenings frequently.

2. If you find that the lacing is badly worn and the belt joint is badly frayed or worn relace the belt with Alligator Steel Belt Lacing.

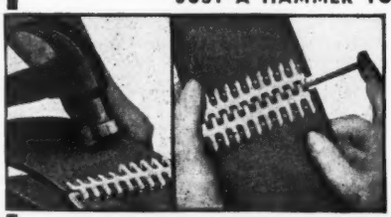
3. Don't throw worn belting away. Worn belting can be reconditioned or you can easily make up a serviceable belt by cutting out the best sections of old belts and then splicing them together with Alligator Steel Belt Lacing.

4. Be sure and use the size of Alligator Steel Belt Lacing recommended for the thickness of belt to be spliced.

5. Where belts are to be laced that are wider than the standard lengths of 6, 8 or 12 inches, Alligator Belt Lacing is available in continuous lengths for any width of belt. The continuous length is easier to apply and makes a more uniform and longer lasting joint.

6. Write for our Bulletin A-60 that gives complete details on how to lace flat belts of leather, rubber, balata, canvas, from 1/16" to 5/8" thick and as wide as they come.

JUST A HAMMER TO APPLY IT



● Lacing can be applied right at the location of the belt without even taking the belt off the line shaft. Alligator has strength with long life, compression grip, is smooth on both faces and the joint is easy to take apart at any time regardless of the amount of wear.

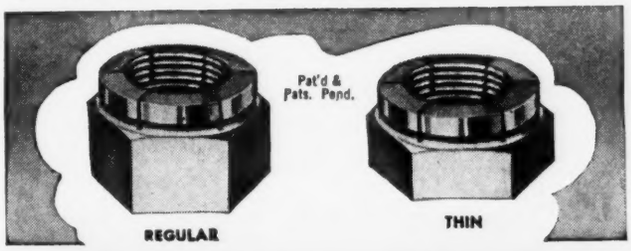
FLEXIBLE STEEL LACING CO., 4638 Lexington St., Chicago 44

ALLIGATOR
TRADE MARK REG. U.S. PAT. OFFICE

STEEL BELT LACING

For more than 30 years the most universally used steel belt lacing in the world.

FREE SAMPLES



FLEXLOC

SELF-LOCKING NUTS

"Flexloc" is of one-piece all-metal construction, available in U.S.S. and S.A.E. thread series. Every thread of the "Flexloc" —including the locking threads—takes its share of the load, and the torque is unusually uniform because it is controlled. "Flexloc" accommodates itself to a wide range of tolerances . . . can be used over and over again, without losing much of its locking torque . . . is not affected by temperatures likely to be met within the field of Mechanical Engineering . . . being a "stop" nut, it *stays locked* in any position on the threaded member.

It is made by the manufacturers of the unexcelled "Unbrako" Socket Screw Products—guaranteeing quality. Sizes from #6 to 1" in diameter—in both "regular" and "thin" types (shown above).

MILLIONS OF "FLEXLOCS" NOW IN USE

OVER 44 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PA. BOX 738

BOSTON • CHICAGO • DETROIT • INDIANAPOLIS • ST. LOUIS • SAN FRANCISCO

Sand Drying Stoves

The SUTTON No. 0 IMPROVED SAND DRYER includes all the time-tested principles that have made SUTTON STANDARD Sand Dryers a favorite for over forty years, plus many improvements to give you even better results. Write for catalogs, prices.

- PERFORATED RING — Entirely new design.
- A FIRE BOWL added between the grate and perforated ring. New type FIRE GRATE.
- ASH PIT DOOR EXTENSION to protect clean sand from ashes.
- 3/16" STEEL PERFORATED SKIRTING with clean-out doors.
- ECONOMY FLAME SPREADER in dome.

SUTTON

Made by **INDIANA FOUNDRY CO.**

950 Oak Street Indiana, Pa.

Stop That Dust with COMPOUND M CARTRIDGE

You can reduce costly mine dust nearly 80%—easily and inexpensively—by using Compound M Cartridge — the new solidified "wetting" compound. All you have to do is make a simple installation of the automatic unit in your water supply pump—no motor, pump, or hand labor—the water pressure does the spraying.

IT PAYS TO USE COMPOUND M

- **Reduces dust in the air, dust accumulations, and retrogression of rock dust.**
- **Increases visibility — aids production — cuts down accidents.**
- **Reduces use of water by about 75%—aids preparation—reduces possibility of freezing.**
- **Aids in preventing respiratory diseases—decreases absenteeism.**
- **Recommended for all safety codes.**

COST IS NOMINAL

Repaid many times by increased production, efficiency and safety. Used in hundreds of mines all over the world.

Representatives in All Centers.

The JOHNSON-MARCH CORP.

Manufacturers of Chemical Products for Mining and Industry

52 VANDERBILT AVENUE • NEW YORK 17, N. Y.

Approximately 25,000,000 pounds available on continuous sale. Sale to priority groups closes Sept. 2, 1947

PRICE, F. O. B. LOCATION, 4½¢ PER LB.

This material is available for immediate sale and delivery to all classes of purchasers at the following War Assets Administration Regional Offices in the approximate quantities shown. Offers to purchase may be made at any WAA office, or by letter, wire, or personal visit to any of the Regional Offices listed. If your offer is written mark your envelope "Offer to Purchase Trinitrotoluene, A-128".

WAA OFFICE	½ LB.	1 LB.
Birmingham	——	482,000
Chicago	——	1,160,700
Cincinnati	21,145	3,527,595
Denver	1,202,900	463,841
Grand Prairie, Texas	——	693,870
Los Angeles	——	867,630
Minneapolis	——	1,600,530
Nashville	1,616,600	——
New York	——	50,000
Omaha	1,064,900	1,843,200
Philadelphia	——	1,170,000
Portland	27,556	1,436,024
Salt Lake City	341,980	8,320,745
San Francisco	45,710	51,747
St. Louis	8,500	——
	4,329,291	21,667,882

This is a concurrent and continuous sale, 10% reserved for Federal Agencies and Priority Claimants until September 2nd. All orders received from priority claimants will be filled from the reserve. Non-priority orders will be filled immediately upon receipt.

This material is offered, as is, subject to inspection by purchaser at location, without expressed or implied warranty except as to title. WAA reserves the right to reject any or all offers, and to make awards in whole or in part. All items subject to prior withdrawal.

Purchasers of Trinitrotoluene are required to observe all applicable laws regulating the sale, use, handling and storage of explosive materials.

Purchaser's order must state thereon: (a) "This order is subject to War Assets Administration Standard Conditions of Sale, and all other advertised terms and conditions, and no other terms or conditions should be binding on War Assets Administration", (b) Type of business and level of trade. Orders from veterans must show certification date, case number and location of certifying office.

T. N. T. is relatively insensitive to shock and is one of the most stable of the high explosives. For many blasting operations it is superior to dynamite.

T. N. T. does not deteriorate like dynamite and turning, to prevent deterioration, is not required. It can be stored over long periods of time and can be handled and shipped with comparative safety.

T. N. T. burns at 266 degrees F. and can be burned in the open in small quantities without exploding. If burned in confinement or in large quantities, it explodes.

T. N. T. is insoluable in water and may be used in underwater charges. It is non-hygroscopic and does not form sensitive compounds with metal.

USES

T. N. T. can be used wherever 40-60% dynamite is employed with the *exception of underground operations* or for use in closed spaces because its explosion produces poisonous gases.

It can be used for swamp drainage and is highly efficient in quarrying, above ground mining, road construction, soil conservation, mud capping, stump removal, seismographic surveying, and for "blowing out" oil well fires.

The use of Primacord (in place of caps) on each block of T. N. T. is recommended. Then there is no danger of detonating unexploded caps when clearing holes.

OFFICE OF GENERAL DISPOSAL

WAR ASSETS ADMINISTRATION

GOVERNMENT WAA SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte Chicago • Cincinnati • Cleveland • Denver • Detroit • Grand Prairie, Tex. • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Omaha • Philadelphia • Portland, Ore. • Richmond • Salt Lake City St. Louis • San Antonio • San Francisco • Seattle • Spokane • Tulsa

1297

Customer Service Centers in these and many other cities.

KEEP TOOLS SHARP with QUEEN CITY Low-Cost GRINDERS

It takes a top-quality grinder to stand up under the heavy work that pours through a mine maintenance shop. Queen City Grinders are noted for their durability, freedom from downtime, and dependable performance.

Illustrated is a Heavy Duty Queen City Floor Grinder equally adaptable to fine or heavy work. Has numerous safety and operating features. Send for catalog complete with prices and details.

QUEEN CITY
MACHINE TOOL CO.

215 E. 2nd St.
Cincinnati 2, Ohio

Agents in Principal cities

Announcing the new

SPB*

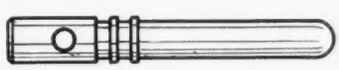
Molded rubber connectors

* MINES new SPB *Straight Pin Bigun* Molded Rubber Connectors are today's outstanding buy for Portable Electrical Power transmission. They have a molded in *Water Seal* and threaded couplings that prevent accidental disconnects. Their use permits sectionalizing of cable to keep minimum amount in service and makes it possible to replace damaged sections quickly. Available for A. C. or D. C. operation with 2, 3 or 4 conductors. Also with pilot circuits to make connectors *Permissible Type* when used with MINES Safety Centers.

1 SPRING LOADED FEMALE SOCKETS

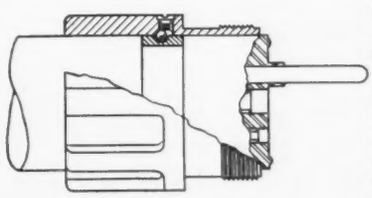
Female sockets in MINES Molded Rubber SPB Connectors are *split sleeve, spring loaded* and *ring encased*. This insures snug contact along entire length of male pin and automatically compensates for normal wear. Solid ring, slip encasement prevents female ferrules from being damaged by overenlargement.

2 SOLID MALE CONTACT PINS



Male pins in MINES Molded Rubber SPB Connectors are accurately machined from low resistant rod material carefully selected for strength. *They are solid.* No split ends to collect dust or increase resistance. Contact pressure maintained over entire length of male pin by springloading in female socket.

3 BALL BEARING TYPE COUPLINGS



MINES SPB Connectors are readily engaged or disengaged. Threading action of "fire-hydrant-type" couplings quickly and positively connect or disconnect. The larger sized connectors have ball bearing type couplings permitting hand engagement and renewal of coupling members if damaged. See sketch at left for constructional details.

WRITE NOW FOR COMPLETE DETAILS

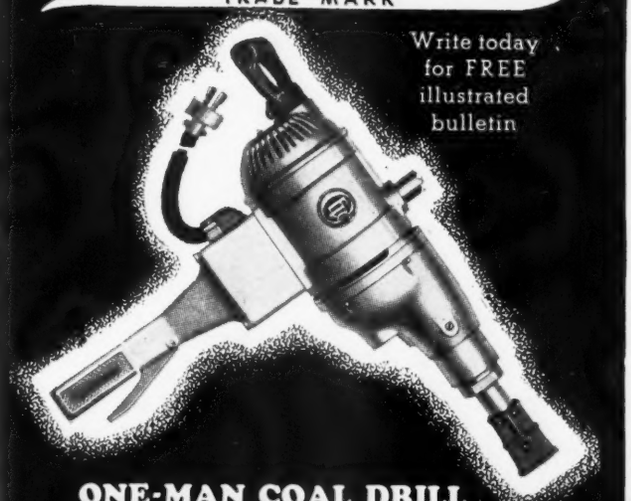
ON MINES OUTSTANDING NEW SPB CONNECTORS !

MINES EQUIPMENT COMPANY

4229 CLAYTON AVE. MINES ST. LOUIS 10, MO.

The Cincinnati

TRADE MARK



Write today for FREE illustrated bulletin

ONE-MAN COAL DRILL

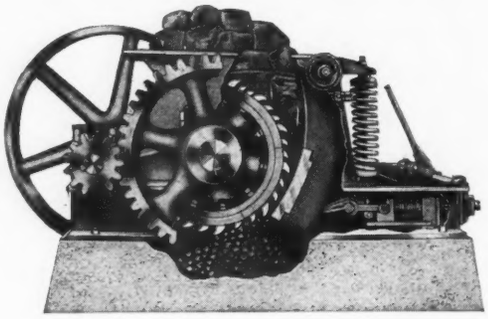
. . . lowers drilling costs because it is designed and constructed to give more power "pound for pound" and more drilling efficiency "day after day". Used successfully in drilling both anthracite and bituminous coal. Easy to operate. Sold with money-back guarantee. Write today.

THE CINCINNATI ELECTRICAL TOOL CO.
Division of The R. K. LeBlond Machine Tool Co.
2635 MADISON ROAD - CINCINNATI 8, OHIO

McLANAHAN BLACK DIAMOND CRUSHER

•With Automatic Steelstrut Toggle and Quick Adjustment

DEPENDABLE — ECONOMICAL



FAST — POWERFUL

Built for "peak" production under difficult working conditions—McLanahan Black Diamond Crushers are doing an outstanding performance job for hundreds of important coal producers. For present needs or future modernization of your workings—call on McLanahan. Built in all capacities for any sized product required. Descriptive data on request.

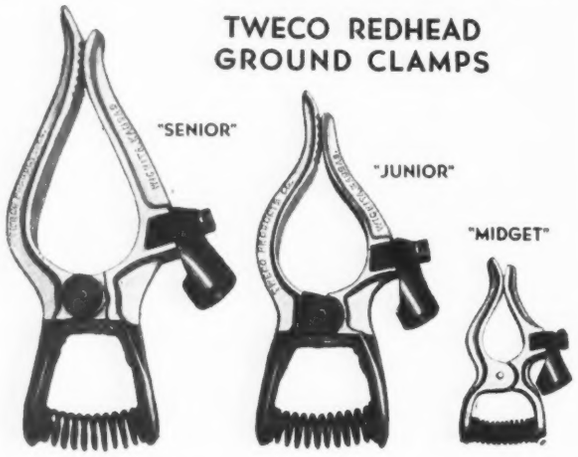
McLANAHAN AND STONE CORPORATION

Pit, Mine and Quarry Equipment Headquarters Since 1835

HOLLIDAYSBURG, PENNA.

WELD WITH TWECO

TWECO REDHEAD GROUND CLAMPS



"REDHEAD" Welding Ground Clamps are made in three sizes: Midget 125 amp., Jr. 300 amp., Sr. 500 amp. Provide a quick positive and portable ground. These high copper alloy grounds have an insulated spring, clamp cable connector; ruggedly built, low in cost.

"TWECOTONG" Insulated Holders come in 250, 300 and 500 ampere sizes. Glass Cloth Bakelite Insulation. Neoprene spring covering. Cool running, positive grip, perfect balance.

Free TWECOLOG gives full price and parts information on all TWECO Electrode Holders, Clamps, Splicers, Connectors, Terminals and Lugs.

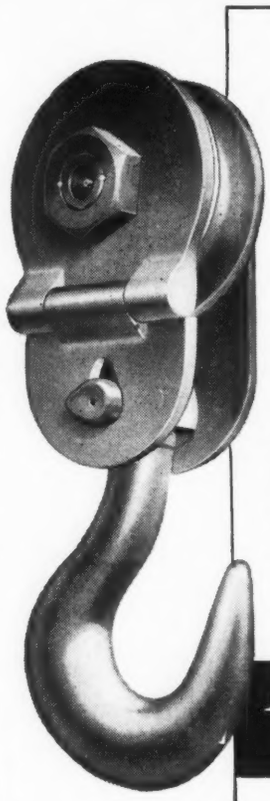
MANUFACTURED BY

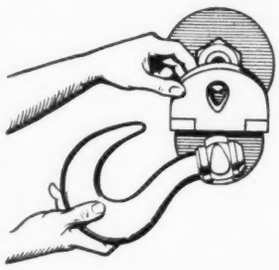
TWECO PRODUCTS CO. 1030 E. English Wichita 1, Kans.

Export: Henry R. Jahn & Son, 7 Water St., New York, N. Y.
In Canada: G. D. Peters & Co. of Canada Ltd., Montreal-Toronto

TWECO PRODUCTS

"CONNECT WITH TWECO"





NEW

GENERAL UTILITY SNATCH BLOCK!

● *Completely* NEW! It's compact . . . only 14 7/8" overall. Simple, smooth-acting latch. Super-safe and super-strong. Specially designed 6" sheave handles any wire rope up to 7/8". Distributors everywhere.

American Hoist and DERRICK COMPANY

St. Paul 1, Minnesota

IF YOU WANT
ARMORED CONSTRUCTION
IN BLOCKS AND SHEAVES,
SPECIFY "AMERICAN HOIST"

723

Parmanco

MECHANICAL FEED HORIZONTAL DRILL.

Ten years of field test has proven that our power-feed design of direct, transmission and worm gearing with two-speed control will not only cut shot hole drilling time in half but also eliminates costly maintenance delays. V-belt drive to the power-feed with an additional ample clutch in that assembly gives absolute control of a drilling speed of two to three feet per minute with a retrieving speed of twenty-four feet per minute.

The Parmanco Horizontal is adapted to all forms of highwall drilling, will handle a six-inch auger up to a distance of sixty feet or more and, by use of our patented augers with interrupted flights and secondary cutters, will drill an absolutely clean hole with a minimum of torque. It permits the drilling of a controlled-angle hole which makes possible a great saving of explosives through the cantilever effect of this controlled-angle drilled hole.

EFFICIENT STRIPPING STARTS WITH EFFICIENT DRILLING

PARIS MANUFACTURING COMPANY
PARIS, ILLINOIS

Did You Get Your Copy?

Send for this free BOOK *Today*

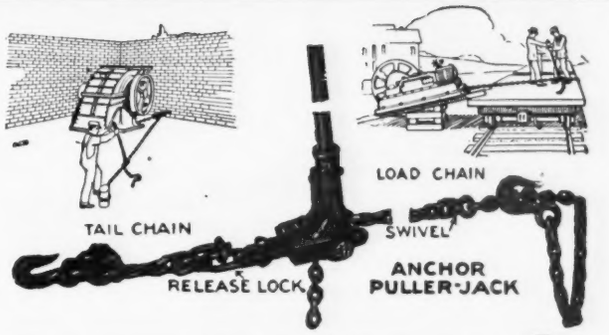
Contains a wealth of Valuable Data on PREVENTIVE MAINTENANCE of Commutators and Slip Rings

Make sure your files contain a copy of this handy reference guide—for all sizes of motors and generators. It illustrates and describes the latest methods and equipment for commutator and slip ring maintenance, including Ideal Resurfacers, Cleaning Stones, Brush Seaters, Undercutters, etc. Write now for your copy of this Free Book!

IDEAL

IDEAL INDUSTRIES, Inc.
Successor to Ideal Commutator Dresser Co.
1013 Park Avenue Sycamore, Illinois

One Man Moves 5 Tons with the ANCHOR Puller-Jack!



Here's a one-man gang that quickly repays its price in labor, time and money saved. Has 3 tons direct pulling power, or 5 tons with sheave block. Pulls 15 feet without changing hold. Can be operated upright, sideways or upside down, with lever pull away from load or toward it. Simple, strong, foolproof. Practically nothing to get out of order. Positive action, always holds. Compact, quick and easy to set up and use. Hundreds of uses for this powerful tool wherever heavy objects must be moved. Order an ANCHOR Puller-Jack today, or write for descriptive catalog.

Easily carried and operated by one man.

$57.50 F. O. B. Bowerston, Ohio. Jack complete with 3 ft. steel tube handle, 15 ft. load chain with slip hook, and release lock. Longer chains available.

THE MINING SAFETY DEVICE COMPANY
DEPT. CA • • • • • BOWERSTON, OHIO

NUSSCO AUTOMATIC MINE SIGNALS

For Main Haulage • Prevent Collisions
Save Trip Time

A two wire cable connects two or more signals together into one block. Only one signal can show proceed on the entrance of a trip, all other signals show stop.

Low in cost • Easy to install • Write for Catalog

NACHOD & UNITED STATES SIGNAL CO.
INCORPORATED
4771 Louisville Ave., Louisville, Ky.

CESCO ELECTRICALLY OPERATED TRACK SWITCH

Thrown by Motorman
Operates Switch Safely • Saves Time and Money

This modern track switch is thrown swiftly and safely by motormen as they sit in their cabs. It saves time and money, and is fool-proof and dependable!

Over 40 years experience manufacturing
ELECTRIC TRACK SWITCHES

Write for Catalog

CHEATHAM ELECTRIC SWITCHING DEVICE CO.
INCORPORATED
4780 Crittenden Drive, Louisville, Ky.

PERFORATED METAL
COAL MINING SCREENS
Manufactured exactly to your specifications.
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.
CHICAGO PERFORATING CO.
2443 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

"We look into the Earth"

CORE DRILLING —anywhere!

PENNSYLVANIA Drilling CO.
DRILLING CONTRACTORS

1205 Chartiers Ave. PITTSBURGH, PA. WAlnut 5816

ROOM HOIST CONTROL

Flood City type "AT" Room Hoist Controller uses a totally enclosed drum type controller and resistance for use with 3 or 5 H.P. series or compound wound D.C. motors. A light, durable controller.

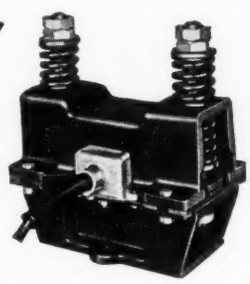
Write for catalogs and information on FLOOD CITY Mine Equipment.

FLOOD CITY
BRASS & ELECTRIC CO.
JOHNSTOWN PA.
4 VIRGINIA ST., W. CHARLESTON, W. VA

SYNTRON

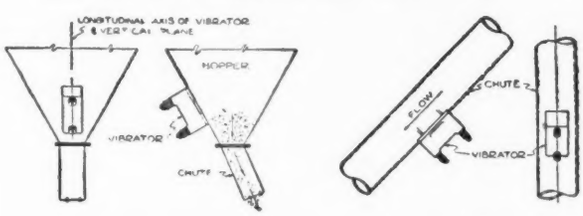
"Pulsating Magnet"

ELECTRIC VIBRATORS



Keep Coal Moving

out of bins, hoppers and chutes



Powerful, pulsating electromagnets, with rheostat control of power, that break down arching and plugging.

Send us a description of your particular problem —giving thickness of hopper wall, cubic content, etc.—we'll be glad to submit recommendation.

SYNTRON CO., 975 Lexington, Homer City, Pa.

POSITIONS VACANT

ELECTRIC SHOP foreman with job shop experience by a large general repair shop in W. Va. doing principally coal mine repair work. Must be a high-class, experienced man. Principally with coil making experience as well as A.C. & D.C. windings. Excellent opportunity for an ambitious man. Give full particulars and salary expected. P 1310, Coal Age, 330 W. 42nd St., New York 18, N. Y.

WANTED—GRADUATE mechanical engineer for sales development in mining and heavy industry by midwestern manufacturer of mechanical rubber products. State qualifications and experience. Write P 1290, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

BUSINESS OPPORTUNITIES

Coal Land for Sale
or lease by owner. 1759 acres sewell and other seams, located near railroad in the new Nicholas County field, W. Va. Details on request. BO 1473, Coal Age 330 W. 42nd St., New York 18, N. Y.

Wanted a Partner
with capital or equipment to develop large block of excellent quality coal. Good market, near Youngstown, Ohio. BO 1235, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

Have Patent
on coal washing machine. Would like to contact modern machine and fabricating plant already doing business with mining industry. BO 1197, Coal Age, 330 W. 42nd St., New York 18, N. Y.

WANTED

ANYTHING within reason that is wanted in the field served by Coal Age can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

SEARCHLIGHT SECTION

(Classified Advertising)

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BUSINESS: :USED OR RESALE

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90c a Line, minimum 4 lines. To figure advance payment count 6 average words as a line.
Positions Wanted (full or part time salaried employment only ½ the above rates payable in advance.
Box Numbers—Care of publication New York, Chicago or San Francisco offices count as 10 words.
Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display of advertisements.

The advertising rate is $7.25 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received by January 31st will appear in the February issue, subject to limitations of space available.

FOR SALE—PIPE MACHINE

12" Williams (Oster) complete with variable speed motor and controls and very large assortment of new and used dies. GOOD CONDITION. Price $700.00.

THE OHIO DRILLING COMPANY
Massillon, Ohio

FOR SALE

1—Sullivan Mining Machine, Type CLU, track mounted, 500 volts, 40" gauge, with coils and armature to change to 250 volts.
1—Jeffrey 13-Ton Haulage Locomotive, 500 volts, with spare armature.
1—G.E. 10-Ton Haulage Locomotive, 500 volts, with spare armature.
1—150 K.W. Ridgeway M.G. Set, 500 volts.

LOYALHANNA FUEL COMPANY
Blairsville, Pa.

FOR SALE

2—Battery Charging Units in A-1 Condition. Joy Model No. U-248-30-H, Serial Nos. 27279-80 and 27281-82. Each unit is equipped to charge four 90 volt shuttle car batteries or equivalent 48 cell batteries. Each is a complete motor generator set with a 50 HP, 220/440 V., 3 ph., 60 cycle motor and 30 Kw., 132 V., 284/64 Amp. DC Generator.

FS1364, Coal Age
520 N. Michigan Ave., Chicago 11, Ill.

Colorado Coal Mine For Sale at $110,000.00

Equipped and operating coal mine near Gunnison, Colorado. A million or more tons of best and cleanest bituminous coal in Colorado; Deeded land; market for all coal mined; good equipment. Property completely controls all access to additional millions of tons same grade coal on adjoining Government land.

McINTOSH-BARTON & CO.
REALTOR
1658 Broadway
Denver, Colorado Phone TA 6235

WANTED

TIPPLE

5-track wooden tipple, complete, including reciprocating feeder, conveyor, shaker screens, 2 loading booms, 2 crushers, Bradford Breaker, vibrating screens, car retarders, tracks and tack scales. Capacity 3,000 tons daily. Was in use until November 1, 1946. Located in Pike County, Indiana.

BLACKFOOT COAL & LAND CORP.
907 Citizens Bank Bldg. Evansville 17, Ind.

FOR SALE

STRIP COAL LEASE Located in ROUTT COUNTY, COLORADO.
For information, write:
Kenehan and Maker, *Attorneys-at-Law*
330 Symes Building Denver 2, Colorado

—TRANSFORMERS—

TRANSFORMERS WANTED

in operating condition or burnt out. Mail us list giving complete nameplate data and stating condition.

We Rewind, Repair and Redesign All Makes and Sizes
ALL TRANSFORMERS GUARANTEED FOR ONE YEAR

THE ELECTRIC SERVICE CO., INC.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
Station M Since 1912 CINCINNATI 27, OHIO

COAL LANDS

Suitable for strip mining. Complete details upon request.

G. B. LORRAINE
Law Building, Richmond 19, Va.

WANTED

2—25 to 30 ton Steam Dinkies, 36".
15-25 ton Gas or Diesel, 36" ga.
Railroad and Truck Scales.
⅝-1 and 1½ yd. Gas or Diesel Shovels.
40-85 ton Diesel Electric Locomotives.

McCARTNEY MACHINERY CO.
Box 35 S.S. Youngstown, Ohio

FOR SALE

LOADING MACHINES

Two L-500 Jeffrey Loading Machines, permissible type, 250 volt D.C., 42" track gauge, immediate delivery.

FS 407 Coal Age,
330 West 42nd St., New York 18, New York

Wanted

STEEL TIPPLE

3 or 4 Track Steel Tipple fully equipped with screens, picking tables, loading booms and power equipment. Capacity not less than 2,000 tons per day.

W-1062, Coal Age,
330 West 42nd St., New York 18, N. Y.

WANTED

¾ to 4 yard Shovels
2 to 8 yard Draglines

FRANK SWABB EQUIPMENT CO., Inc.
HAZLETON, PA.
Telephones: 4910J and 4911

FOR SALE: CENTRIFUGAL PUMP

1 De-Laval All Bronze (3 Stage) Centrifugal Pump. 400' Head, 700 Gal. per minute with Cast Iron Base. Less Motor. Price very reasonable.

KOTTLER'S AUTO WRECKING CO.
Morgantown, W. Va.

WANTED TO BUY

FOUR YARD SHOVEL FOR STRIPPING. NEW OR USED. WRITE PENOWA COAL CO., 2617 GRANT BUILDING, PITTS., PA.

WANT TO BUY

3 to 5 ton storage battery locomotive with charger for 42" track gauge. Must be in good condition and reasonably priced.

FISHER COAL COMPANY
Box 1511 Knoxville, Tenn.

LOCOMOTIVES—250 VOLT DC

6—15-ton Jeffrey, type MH-110.
3—13-ton Goodman, type 136-B.
2—13-ton Westinghouse, type 908-C.
4—10-ton Jeffrey, type MH-78.
5—10-ton General Electric, type HM-830.
3—8-ton Westinghouse, type 906-B.
3—8-ton Jeffrey, type MH-100.
6—8-ton General Electric, type HM-839.
5—8-ton Goodman, type 32-I-4-T-2.
6—6-ton General Electric, type HM-801.
The 6 and 8-ton Locomotives are equipped with CY-21 motor driven gathering reels and cable, track gauge 36" to 44".

MINE CARS

600—3½-ton End Dump Steel Mine Cars, overall length 10'2", Timken roller bearing wheels 18", height overall 46", axles 3", steel bodies 3/16", 3" oak bottoms, track gauge 42". Excellent condition—Bargain for quick sale—$75.00 each.

CUTTING MACHINES—250 VOLT DC

20—12-AA Goodman, 50 H.P.
12—112-AA Goodman Universal, 50 H.P.
5—112-CA Goodman Universal, 50 H.P.
8—7-B Sullivan, 50 H.P.
10—24-L Jeffrey, permissible type Longwall Machines.
12—Joy T1 Caterpillar type trucks.
The above machines are equipped with tip-turn trucks, cable reel and cable.

LOADING MACHINES—250 VOLT DC

5—L-400 Jeffrey.
2—260 Goodman.
8—7-BU Joy.
2—11-BU Joy.
3—Myers-Whaley.

LOADING AND CUTTING MACHINES—220/440 VOLT AC

8—7-BU Joy. Just taken out of service.
8—112-G3 Goodman Universal, tip-turn trucks, cable reel and cable.

ELECTRIC HOISTS

1—Nordberg Shaft Hoist with 1600 H.P. General Electric Motor and all necessary appurtenances.
1—1300 H.P. Nordberg Shaft Hoist with all necessary appurtenances.
Several other hoists from 200 to 1000 H.P., suitable for shaft, slope or drift mine.

MOTOR GENERATOR SETS

2—300 KW Allis-Chalmers, 250/275 volt DC, 2300/4000 volt AC, 3 phase, 60 cycle.
2—200 KW Ridgway, 250/275 volt DC, 3 phase, 60 cycle, 2300 volt AC.
The above sets are complete with switchboards, switchgear and automatic reclosing circuit breakers for the DC end.

STEEL TIPPLES & MISCELLANEOUS

We have several 3, 4 and 5-track steel tipples, complete with shaker screens, vibrating screens and all necessary appurtenances, suitable for shaft, slope, drift or strip mines.
1—Jeffrey 10' Aerovane single stage blowing fan.
1—Belt Conveyor, 7-ply, 32 oz., 42" Goodyear belt, steel carrying frame, Timken bearing carrying and return idlers, complete with 75 H.P. motor, 450' centers.

WE SPECIALIZE IN BUYING COMPLETE MINES THAT ARE GOING OUT OF BUSINESS OR FROM RECEIVERS IN BANKRUPTCY, ADMINISTRATORS OF ESTATES, ETC.

COAL MINE EQUIPMENT SALES COMPANY

306-7 BEASLEY BUILDING **L. D. PHONE—34** **TERRE HAUTE, INDIANA**

COAL CUTTING MACHINES

1—35B Jeffrey Shortwall, 250 V., D.C.
1—35BB Jeffrey Shortwall, A.C.
2—29C Jeffrey Arcwall, 250 V., D.C.
1—124 E. J. Goodman Slabbing, 250 V., D.C.
1—36B Jeffrey Longwall, 250 V., D.C.
1—12G3 Goodman Shortwall, A.C.
2—112 C.A. Goodman, 250 V.

LOCOMOTIVES

1—5-ton Goodman with 2 type 41, 250 V. motors.
1—5½-ton Ironton Storage Battery Locomotive.
1—6-ton Jeffrey with MH 88, 250 V. motors.
2—15-ton G.E., 250 V.

M. G. SETS

1—60 KW, 250 V., D.C., with 100 HP Synchronous Motor.
1—75 KW, 250 V., D.C., with 112 HP Synchronous Motor.
1—150 KW Ridgeway, 275 V., D.C., 3/60/2200/1200.

ELECTRIC MOTORS

1—400 HP Allis-Chalmers SC 3/60/2200/1150.
1—250 HP G.E. Slipring, 3/60/2200/600 RPM.
1—200 HP Westinghouse, type CW, slipring, 3/60/2200/514 RPM.
1—185 HP Burke SC 3/60/2200/1150.
1—150 HP G.E. Squirrel Cage 3/60/900.
1—125 HP G.E. Squirrel Cage 3/60/900.
1—100 HP Synchronous Motor 3/60/440/1290 RPM.
1—100 HP G.E. Squirrel Cage 3/60/900 RPM.
1—40 HP Westinghouse Squirrel Cage 3/60/1800.
1—25 HP G.E. Squirrel Cage 3/60/720.
2—15 HP Westinghouse Squirrel Cage 3/60/900.
1—7½ HP G.E. Squirrel Cage 3/60/1800.
1—5 HP Westinghouse Squirrel Cage 3/60/1800.

TRANSFORMERS

3—333 KVA Westinghouse, 22000 V. to 230 V.
1—100 KVA 3/6900/220/440.
1—50 KVA Westinghouse 1/60/2300/220/440 V.
2—15 KVA 1/60/2300/220/440.
1—15 KVA 1/60/2300/220/110 V.

COAL CRUSHERS

1—36" x 36" Jeffrey S. R. Coal Crusher, gear drive.

TIPPINS MACHINERY CO.

PITTSBURGH 6, PA.

AIR COMPRESSORS:

12—Belted 360, 676, 870, 1000, 1300 ft.
12—Diesel 105, 315, 520, 676 & 1000 ft.
6—Electric 1300, 1500, 2200, 5000 ft.

CARS & LOCOMOTIVES:

100—50 ton cap. Gondolas.
35—50 ton cap. Flat Cars.
4—35 & 65 ton Diesel Locomotives.
6—10, 16, 20 & 30 ton Gas Locomotives.
150—8000 & 10000 gal. cap. Tank Cars.
20—12 yd. Std. ga. Steel Dump Cars.
1—50 ton G.E. Diesel Elec. Locomotive.

RUBBER CONVEYOR BELTS:

1000', 60", 600' 30", 300', 20", 1000', 42", 900', 48", 1450', 36", 1200', 24", 900', 18", 600', 16", 350', 14".

ELECTRIC LOCOMOTIVES:

15—3, 5, 8 ton Battery & Trolley.

DIESEL GENERATORS:

12—100, 150, 180 & 480 K.W.

MINE LOADERS:

17—GD9, Elmco 21, Conway 20, 50, 60 & 75 and Sullivan HL3.

STEEL TANKS:

6—50,000 and 100,000 gal. Tanks on tower.
30—8000, 10,000 and 20,000 gallon capacity.

SHOVELS — DRAGLINES:

7—1 yd., 1½ and 2 yd. Gas & Diesels.
16 yd. Elec. 160 ft. Boom Dragline.

R. C. STANHOPE, INC.

60 E. 42nd Street **New York 17, N. Y.**

MINING MACHINES

AC or DC
REBUILT & GUARANTEED
FOR IMMEDIATE SHIPMENT

COAL CRUSHERS
Single & double roll.

Electric Coal Drills, Mine Fans, Vibrating Screens, Electric Generators, Motors, etc.

CONVEYORS — Belt and Drag. Also gravity conveyors, bucket elevators, etc.

The INDUSTRIAL EQUIPMENT Corp.

(Established 1902)
910 First National Bank Bldg.
PITTSBURGH 22, PA.
Warehouse: Carnegie, Pa.

NORTHWEST NO. 8 DRAGLINE with 2-yd. Dragline Bucket. Powered by 6 cyl. Wisconsin gasoline engine. Now used in coal stripping.

IRON & STEEL PRODUCTS, INC.

13484 S. Brainard Ave., Chicago 33, Illinois
"ANYTHING containing IRON or STEEL"

ENGINE GENERATOR SET

250 KW Croc. Wh. D.C. Genl., Com. Interpole, 125 V., 2,000 Amp. 150 RPM, D.C. to Erie Ball high speed non-releasing gear Corliss Eng., 4 valve eng. # 6772, size 24 x 27# pres., new 1925. Good con.

PHILA. TRANSFORMER CO.
2829 Cedar St. **Phila., Pa.**

RAILS NEW AND RELAYING

TRACK ACCESSORIES

from 5 Warehouses

- **PROMPT SHIPMENTS**
- **FABRICATING FACILITIES**
- **TRACKAGE SPECIALISTS**

EVERYTHING FROM ONE SOURCE

L. B. FOSTER COMPANY

PITTSBURGH · CHICAGO · NEW YORK

RELAY RAILS

1000 GT 90# ARAB with 4-hole angle bars
400 GT 80# ASCE RAIL & BARS

50,000 Lundie Type Relay Tie Plates for 70# to 112# Rails

60# thru 112# NEW and RELAY TURNOUTS
New Bolts and Spikes Available

MORRISON RAILWAY SUPPLY CORP.

1437 BAILEY AVE., BUFFALO 12, N.Y.
Telephone TAylor 2400

RELAYING RAIL

TRACK ACCESSORIES

MIDWEST STEEL CORP.

Gen. Off.: CHARLESTON, 21, W. VA.
Warehouses
CHARLESTON, VA.
KNOXVILLE, TENN. • PORTSMOUTH, VA.

RAILS—CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

M. K. FRANK

480 Lexington Ave. **810 Park Bldg., Fifth Ave.**
New York, N. Y. **Pittsburgh 22, Pa.**
Reno, Nevada **Carnegie, Pa.**

FOR SALE
USED COAL MINING FQUIPMENT & SUPPLIES

COAL CRUSHERS
2—30" Single Roll Jeffreys.
1—36" St. Louis, Ring Type.
1—10x24 Jeffrey Sling-Hammer Mill.

COAL WASHERS
2—Rheolaveur Launders, 60-80 Ton Capacity, complete with Header, Feed Pipes, Supporting Frame, Dividing Head, Sampler, 10'x12' Steel Bin, etc.

COAL CUTTERS
10—Sullivan CE7 AC Short Wall Coal Cutters, with Tyrex Cable, etc.
1—7-BU Joy Loader, 250 Volts DC, thoroughly overhauled.

TROLLEY LOCOMOTIVES
5—4½ Ton Goodman, 36" Gauge, equipped with Power Reels and Crabs.
2—7½ Ton Goodman, 36" Gauge, Single End Control.

BELT CONVEYORS
1—36" Belt Conveyor, 50' Centers.
1—30" Belt Conveyor, 370' Centers, Motorized.
1—30" Belt Conveyor, 40' Centers, Motorized.
1—30" Belt Conveyor, 50' Centers, Motorized.
1—28" Belt Conveyor, 70' Centers, Motorized.
1—24" Belt Conveyor, 15' Centers, with Ding's Pulley.
1—24" Belt Conveyor, 75' Centers, with Ding's Pulley.
1—24" Belt Conveyor, 85' Centers, Motorized.

MACHINE SHOP EQUIPMENT
1—24"x10' American Quick Change Lathe.
3—Drill Presses, 16" to 28".
1—Pipe Threader up to 2", B.D.
1—Smith Electric Welder, 200 Amps.
1—Gould & Eberhardt Shaper, 18" Stroke, B.D.
1—Cleveland Combination Punch & Shear, B.D.
1—Power Hack Saw, B.D.
Air Hammers, Hand Shears, Swing Cranes with 1½ to 2 Ton Y & T Spur Geared Blocks.

PIT CARS
220—Card 1.7 Ton Capacity, R B. Pit Cars, 36" Ga.
30—1.7 Ton Capacity Pit Cars with Whitney Wonder Bearing Wheels.
1—Card Rocker Dump Car, 90 Cu. Ft. Cap., 36" Ga.

OFFICE EQUIPMENT
2—Monroe Electric Calculators, Late Type.
1—Dalton Adding Machine with Stand.
4—L. C. Smith & Remington Typewriters, Desks & Wooden Files.
1—C. I. Office Safe.

MINE LAMPS
188—Edison Model P Mine Lamps, complete with Racks & Charger.

MINE TRANSITS
1—Ainsworth Outside Mine Transit, complete.
1—Eugene Dietzen Mine Transit, complete.

I-BEAMS
40 Tons—12" & 18" I-Beams, approx. 32' Lengths.

COKE EXTRACTORS
2—Coke Extractors, complete, 250 Volts DC, Std. R. R. Gauge, with new Spare Parts.

LARRY CARS
4—Connellsville Larry Cars, 250 Volts DC.

RAILROAD SCALES
3—100 Ton Fairbanks R. R. Scale, Steel I-Beam Stringers.

TROLLEY & INSULATED COPPER WIRING
Several Miles of 2/0, 4/0 & 400,000 cm. R.C. Stranded Copper Wire.
2/0 & 4/0 Rd. & Fig. 8 Trolley Wire.
Trolley Hangers, Frogs, etc.
Approx. 700' 4/0, 3-Cond. Armored Cable good up to 600 Volts (In two pieces).

MINE FANS
1—8-H60 Aerodyne Mine Exhausting Fan, with Air Locks, Hood, Man Cage, Hoist, Head Frame, etc. Pur. New 1942.

RAIL
100 Tons—65#.
150 Tons—60#.
50 Tons—40#.
75 Tons—30#.
Also Rail Switches complete for above Rail.

HOISTS — ELECTRIC
1—No. 22 Vulcan Hoist, complete with 40 H.P. Motor, Controller & Grids.
1—No. 22 Vulcan Hoist. complete with Man Cage, 30' Headframe & 40 HP. Motor.

MISCELLANEOUS
2—1935 Ford Busses (Later Motors) 40 passenger capacity.
Motors, AC & DC, 2 H.P. to 50 H.P.
Metal Mine Phones, Wall Phones, Jacks, New Supplies, etc.
Drag Chain Conveyors, with Dewatering Screens.

COMPLETE INVENTORY OF AMERICAN SMELTING & REFINING COMPANY'S HOLDINGS AT COKEDALE & BONCARBO, COLORADO, RECENTLY ACQUIRED BY US NOW AVAILABLE. GET IN TOUCH WITH US ON YOUR REQUIREMENTS.

FLORENCE
MACHINERY AND SUPPLY COMPANY

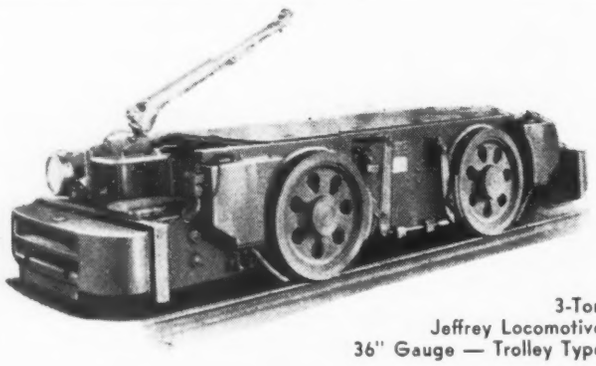
SUITE 904, EQUITABLE BUILDING **DENVER 2, COLORADO**

C. J. Parrish, Mgr.
Phone: Alpine 2803
Yards: Denver and Florence, Colo.

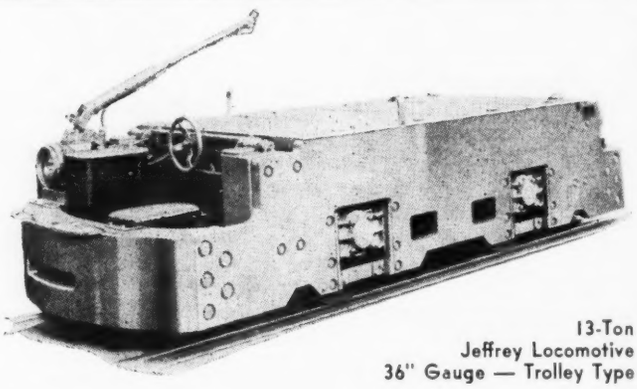
COMPLETE LIQUIDATION

IMMEDIATE DELIVERY

. . . Three and one-half million dollars in new and nearly new coal mining machinery and equipment

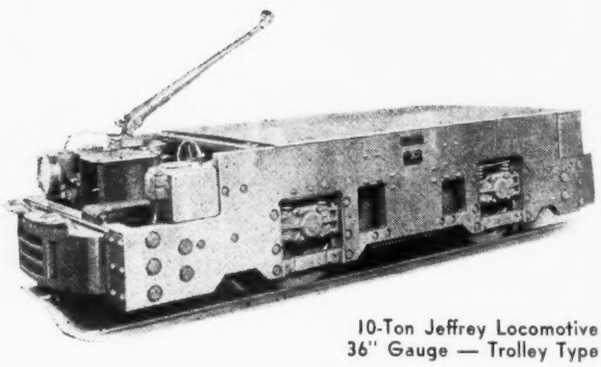


3-Ton
Jeffrey Locomotive
36" Gauge — Trolley Type



13-Ton
Jeffrey Locomotive
36" Gauge — Trolley Type

6-Ton Jeffrey Locomotive 36" Gauge — Trolley Type



10-Ton Jeffrey Locomotive
36" Gauge — Trolley Type

20-Ton Goodman Locomotive High Type — 36" Gauge

8-Ton General Electric
Locomotive — 36" Gauge

WRITE FOR OUR COMPLETE LIST OF MACHINERY AND EQUIPMENT

THE COLUMBINE MINE EQUIPMENT CO., INC.

FLAT IRON BUILDING, 1669 BROADWAY **DENVER, COLORADO**

Subsidiary of Portland Equipment Co., 11 Broadway, New York 4, N. Y.

SEE PAGE 203 FOR APPROXIMATE SUMMARY OF HARD - TO - GET OFFERINGS

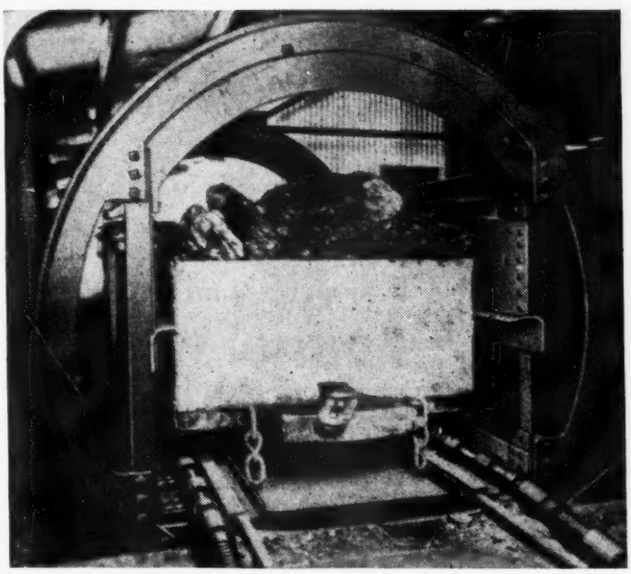
THE COLUMBINE MINE EQUIPMENT CO., INC.

1669 BROADWAY, DENVER, COLORADO

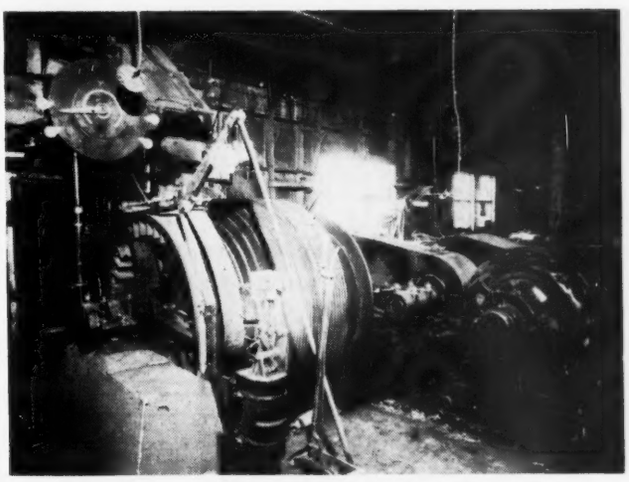
... Three and one-half million dollars in new and nearly new coal mining machinery and equipment

Subsidiary of Portland Equipment Co., 11 Broadway, New York 4, N. Y.

Complete Liquidation . . . Immediate Delivery

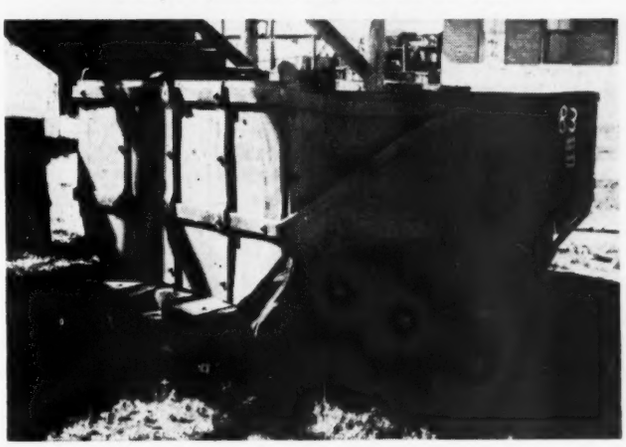


Fast Dumping of Coal Cars



Cornical Drum Hoist, 300 HP, Drum 8'-6" Dia. x 72" wide

Phillip's Crossover Dump and Car Retarder



Tipple Car, 2 Ton, 36" Gauge

HERE ARE SOME OF THE HARD-TO-GET OFFERINGS

HAULAGE MOTORS, trolley type locomotive—electrically driven, 36" gauge, General Electric, Westinghouse, Jeffrey and Goodman.
COAL MINING MACHINES—29 L-E "Arcwall" Jeffrey mining machines mounted on Joy electrically driven caterpillar trucks. Goodman Shortwall No. 112 mining machines.
Goodman 36" Gauge TRUCKS, Type "M."
MOTOR GENERATOR SETS—2 sets 225 H.P. connected to Ridgeway 150 K.W. generators, with panelboards, A.C. and D.C. meters and transformers complete. 2 sets 300 H.P. connected to Ridgeway generators, 200 K.W., complete with panelboards, A.C. and D.C. meters and transformers. And others.
BATTERY CHARGING UNITS—Joy, Westinghouse, Hobart Bros. Co. electric products.
MOTORS—A.C. and D.C., all types, 1 H.P. to 300 H.P., starting compensators and switches.
TRANSFORMERS—General Electric, Westinghouse, 7½ KVA, 37½ KVA and 150 KVA.
BOX CAR LOADERS—Ottumwa—Manerre.
PUMPS—Geared and centrifugal—motor and belt driven—Gould, Demming, and Myers.
FANS—Jeffrey, American Blower, Sturdevant.
TIPPLE—3 track tipple consisting picking screens, grizzlies, car retarders, end dump, belt conveyors, elevator bucket conveyors, box car loaders complete.
VIBRATOR SCREENS—Ty-rock 2 deck screen, full floating.
SHAKER SCREENS—"Marcus" shaker screens.
CONVEYORS—Flight conveyors, elevator conveyors.
COAL CRUSHERS.
RAILS—250 tons 30 lb., 200 tons 40 lb., 150 tons 50 lb., 150 tons 60 lb., 350 tons 65 lb., 200 tons 75 lb.
SPIKES, bolts, tie plates, frogs, switches, switch throws.
COPPER trolley wire—2/0, figure 8 and 2/0 round.
TROLLEY HARDWARE—Hangers, clamps, frogs, switches, roof hangers.
TRANSMISSION WIRE—Single conductor, 2 conductor, 3 conductor—Neoprene, glass, rubber insulated 2/0 to 500,000 CM.
JOY 7-BU. LOADERS—Caterpillar mounted with high pedestal.
SHUTTLE CARS—Joy 42" storage battery.
ELEVATOR CONVEYORS—Joy.
MINING MACHINE TRUCKS—Joy "T-1."
AIR COMPRESSORS.
MACHINE SHOP—Complete.
ELECTRIC SHOP—Complete.
CARDOX PLANT—Complete.
BATTERIES—Exide and Gould Ironclad, 24 cells.
$150,000.00 WORTH of new parts, bearings, gears, bolts, nuts and screws for Joy, Jeffrey, Goodman, Ottumwa, Manerre, General Electric, Westinghouse, Demming, and other popular manufacturers' equipment.

ALSO THOUSANDS OF ITEMS TOO NUMEROUS TO MENTION.

WRITE FOR OUR COMPLETE LIST OF MACHINERY AND EQUIPMENT

MINING MACHINES

Jeffrey: 2—35B, 28A, 250 V. 1—24B Low Vein. 4—29B, 29C, 29CE with shearing head. Also 1 on cats. Revolving head for 29C.

Goodman: 12A, 12AB, 12AA. 512, 12G3A, Shortwalls. 424, 24B, 124E3, Slabbers.
1—12G3, 220 volt and 2—2 DA, 500 volt.
2—Permissible Type 12CA, 6—112AA. Motors for 212AA, both 250 and 500 v.
1—Hitch Cutter for Cross Head timbers.
1—512 Goodman Shortwall Machine, 210 v.
2—Goodman Slabbing Machines, permissible type, 250 and 500 volts.

Sullivan: CE7, CE9, CE10, CR10 Low Vein.
1—Buddy Sullivan 220 Volt. 3 Phase.

SUBSTATIONS — 275 volts, D. C.

1—150 KW **G. E.** MG Set.
1—300 KW **Westing.** Rotary. As is armature needs rewinding.
1—150 KW **West.** MG Set.
1—100 KW **Ridgway** M-G Set.

LOCOMOTIVES

Goodman: All 250 volts.
1—6 ton, 30B, 43" 1—5 ton.
1—5 ton, 8-30 36" gauge.

Westinghouse: All 250 volts.
4—904 c. 44" 500 volts and 250 volt. Also 906 motors and 102-904-115.
Bar steel frames 10 ton, 6 ton, and 4 ton.

G.E.: All 250 volt.
6 ton 803, 44" as is.
6 ton 823, 44". 6 ton 819-821.
6 ton 801. 5 ton 825, 44" & 36".
8 ton 839. 8 ton 839 motors.
1—Battery Locomotive. 1½ ton Mercury, 30" gauge with charger.

LOCOMOTIVES

Jeffrey: 8 ton, 250 volts, type MH73. Locomotive motors and Crabs and Reels for Locomotives.

SPARE ARMATURES

Jeffrey: MH110, MH78, MH73 and MH64-350 V. and 500 V. 29 B, 35B and 28. 35BB, 35A, 29C, 29L, 35L.

Goodman: 34B, 30B, 30C, 12A, 2600 K and R; 12AB, 12AA, 33-1-4-T, 31-1-4-T, 32-1-4-T.

General Electric: 801, 807, 819, 821, 825, 839.

Westinghouse: 904, 905, 906, 102, 907, YR2. 115. Also 200 KW.

Westinghouse Rotary Converter Armature: 250 V. Bracket Type, 150 KW G.E., HCC Bracket Type.

Sullivan: CE7, CE9 and CE10.

OTHER ITEMS AVAILABLE

Aerial Tramways.
Automat Loader: 1 Myers-Whaley #4.
Belt Conveyors: 1 Bucket Elevator Conveyor.
Bit Sharpeners, 2 Sullivan, 1 Diamond.
Blue Print Machine: 42" wide, continuous Mercury Arc Light.
2 **Loading Booms,** 30'x5'.
Bond Welders: Resistance.
Circuit Breakers: AC and DC.
Circuit Breakers, Automatic: 250 volt 600 amps.
Circuit Breakers, Manual: 600 amps to 3,000 amps.
Clam Shell Bucket: 1¾ cubic yard.
Coal Crushers: (double roll) 16"x16", (single roll) 24"x30", 24"x24", 36"x36", 30"x60", 30"x30", 18"x18", 12"x16".
Compressors.
Drop Bar Supports: (Goesenck) 29B and 29C.

OTHER ITEMS AVAILABLE

Dumps: Crossover.
Field Frames.
Generators: DC 250-275 volt. 30 KW to 100 KW.
Hoists.
Hoists: overhead, AC 3-60-440 1 ton and 2 ton. Crabs and Room Hoists.
Lathe: 48"x14' with Taper Attachment and 3-60-220 Motor.
Lathes, Switches.
Loading Machines and Goodman Shaker Conveyors and Duckbills.
Milling Machines, horizontal and vertical.
Mine Cars: 48" gauge.
Mining Machine Trucks.
Motors: Miscellaneous and 1—5-HP Fynn Weichsel, 1800 RPM, 200 Volt Slipring or synchronous.
Motor Starters and Controlers: AC and DC.
Plants: Diesel Power. 55 KVA Rotary Transformers, Voltage 23100/208. Synchronous Motor Starters, full Magnetic Across-the-line, 3 phase, 60 cycle, 150 Volts—2-2—H.P. and 6—250 H.P. Westinghouse.
Pumps: Rebuilt and New.
R. R. Switches: 85# to 100#.
Shaker Conveyors and duckbills.
Slate Larry: 2—5BU on Cats. 2—Myers-Whaley, #3 and #4.
Spare Motors: DC and AC for mining machines and locomotives.
Switchboards.
Speed Reducers.
Transformers.
Tripmakers: 2 car haul.
Welders: AC 220/440 volts, 350 and 400 amp.
1—Spot Welder, 50 KVA, 220 Volts.

GUYAN MACHINERY COMPANY, Logan, W. Va.

SYNCHRONOUS ROTARY CONVERTERS

Qu.	KW	Make	Speed	D.C.V.
1	750	G.E.	1200	600
1	500	Whse.	1200	600
1	400	G.E.	1200	275
1	300	Whse.	1200	275
1	300	Burke	900	250
1	300	Whse.	1200	600
1	300	G. E.	1200	600
1	175	Whse.	1200	275
1	175	G. E.	1200	275
1	125	G.E.	1200	275

MOTOR GENERATOR SETS

3—150 KW, 900 RPM, 250 V. DC to 225 HP. 2300 V. AC Syn.
2—150 KW, 900 RPM, 600 V. DC to 225 HP. 2300 V. AC Syn.

MOTORS

1—80 HP. 1200 RPM, Cr. Wh. 220/440/3/60 Ind.
1—75 HP. 1800 RPM. U. S. Line Start 220/440/3/60 Ind. B.B.
1—65 HP. 1200 RPM, G. E. type KT. 220/440/3/60 Ind.
1—40 HP. 900 RPM, Whse. type CW, 440/3/60 Slip Ring.
5—5 HP. 2200 RPM. Reliance Ex. Proof, 230 V. D.C.
Several Whse. type SK, 230 V. D.C.
5, 7½, 10 and 15 HP. New TEFC and standard open ball bearing AC motors available. Across line and reduced voltage starters.

Electrical Equipment

Converters, Motor Generator Sets, A. C. & D. C. Motors, Control Equipment and Transformers. We build equipment to fit your requirements. engineering background. Over 25 years

C. B. LOCKE CO.
P. O. BOX 3227
TEL. 38-136
CHARLESTON, W. VA.

NEW and REBUILT

TRANSFORMERS

1—200 KVA Kuhlman, Cont. Duty, Auto. 3800-2300/3/60.
3—37½ KVA Pitts. Cont. Duty, Auto. 6900-2300/1/60.

REBUILT MINING MACHINES

6—112 AA and 12 AA Goodman 250 Volts
1—112 G3A Goodman 222 Volts
2—12 A and 12 AB Goodman 250 Volts
4—CE 7 Sullivan A-C and D-C
2—7-B Sullivan 250 Volts

LOCOMOTIVES

1—6 ton Goodman Type 33 250 Volts
1—6 ton Goodman Type 30-13 250 Volts
2—6 ton Goodman Type 2600 250 Volts
1—8 ton Westinghouse Type 906L 250 Volts
1—6 ton GE Trolley and Battery combination
1—12 ton GE Ball Bearing 42" gauge 250 Volt

LOADING MACHINES

2—7 BU Jays 250 Volts 42" gauge
4—5 BU Jays 250 Volts 42" gauge

THOMAS GILLESPIE & SON

State Road 67, BICKNELL, IND.
Phones 179 and 149-K

LOCOMOTIVES

American and Lima 80 ton steam switching locomotives new 1944. Type 0-6-0, 6 wheel equipped with tender. Engines are of the latest construction in like new condition, available at very attractive price. Specifications available. Also have several diesel and gasoline locomotives available from stock.

MISSISSIPPI VALLEY EQUIPMENT CO.
511 Locust St. St. Louis, Mo.

HIGH GRADE TOOLS

2½" Bar Cleveland Horiz. Boring Mill.
3" Bar G & L Horizontal Boring Mill.
21" Cincinnati Bickford Up. Drill.
17"x6' LeBlond Grd. Head Lathe.
18"x18' Sidney Monotrol Lathe.
24"x12' Boye & Emmes Lathe.
30"x18' LeBlond Q.C. Lathe.
#3B Milwaukee Plain Miller.
#3 Cincinnati Universal Miller.
#3 Cleveland Universal Miller.
3' and 3½' Cincinnati Radial Drills.
16" and 24" G & E Shapers.
16" Cincinnati B.G. Shaper.
28" Q & E Shaper.
24"x24"x6' Ohio Planer.
36"x36"x14' American Planer, 4 heads.
Have various other machines in stock.
Send us your inquiries

Cincinnati Machinery Company, Inc.
217 E. Second Street, Cincinnati 2, Ohio

FOR SALE

LORAIN MODEL 82 DRAGLINE.
KOEHRING MODEL 803 DRAGLINE.
LORAIN 75-A SHOVEL—$7,000.
MARION 362 SHOVEL.
LIMA 802 SHOVEL.
CATERPILLAR D-6, 7 and 8 W/DOZERS.

AIR COMPRESSOR RENTAL CO.
19615 Nottingham Rd. KEnmore 8000
CLEVELAND 10, OHIO

WIRE ROPE FOR SALE

Brand New—Ind. Wire Rope Center, 1¼" dia. 6x19. Plow steel. Various lengths from 160 ft. to 3,000 ft. each reel. Also other sizes. Send for list.

TERRY WYNN
Box 118 Wash. Bridge Sta., N. Y. C.

FOR BUYING OR SELLING USED MINING EQUIPMENT CONTACT US FIRST!

MINE EQUIPMENT EXCHANGE
BOX 170 BLUEFIELD, W. VA.

"SEARCHLIGHT"
IS
Opportunity Advertising

—to help you get what you want.
—to help you sell what you no longer need.

Take Advantage Of It

For Every Business Want

"THINK SEARCHLIGHT FIRST"

REBUILT EQUIPMENT—READY TO SHIP

MOTOR GENERATOR SETS—250 V. D.C. (Motors 220/440 or 2200 V., 3 Ph., 60 Cy.)

No.	KW.	Make	Speed
2	40	West.	850
5	50	West.	1200
3	75	Star	1200
2	75	G.E.	600
4	100	Star	1200
1	150	G.E.	1200
1	150	Star	1200
2	200	Star	1200
1	200	Star	1200

D.C. GENERATORS—250 Volts—D.C.

No.	KW.	Make	Speed
10	10	West.	1150
11	15	West.	1400
3	15	West.	1150
2	20	West.	1400
3	20	West.	1150
5	25	West.	1400
4	25	West.	1150
3	40	West.	850
5	50	Louis Allis	1150
4	75	Star	1150
5	100	Star	1200
3	125	Star	1150
1	150	G.E.	720

ENGINE GENERATOR SETS

1—35 KVA 220/440 v., 3 ph., 60 cy., dir. con., Ridgway Steam Engine.
1—125 KVA 240/480 v., 3 ph., 60 cy., West. dir. con., to Erie Ball Engine Electric Light Plants—gas, Gasoline and Diesel AC and DC—1 KW, 2 KW, 5 KW, 7½ KW, 10 KW, 25 KW, 60 KW and 100 KW.

D.C. MOTORS — 230 Volts

No.	HP.	Make	Rpm.	Type
20	½	West.	1750	CDH
12	¾	West.	1750	CD
18	¾	Wagner	1725	—
15	¾	West.	1140	CD
47	1	West.	1725	CD
30	1	West.	1140	CD
6	1	West.	865	CD
18	1½	West.	1725	CD
17	1½	West.	1180	CD
14	1½	West.	900	CD
23	2	West.	1725	CD
26	2	West.	1150	CD
20	2	West.	850	SK-23
20	3	West.	1725	CD
25	3	West.	1150	SK-23
15	3½	West.	850	SK-30
20	5	West.	1800	SK-20
44	5	West.	1150	SK-30
20	5	West.	850	SK-43
15	7½	West.	1750	SK-33
16	7½	West.	1150	SK-43
10	7½	West.	975	——
6	7½	Cr. Wh.	875	CCM
8	7½	West.	850	SK-60
4	10	West.	1750	SK-43
10	10	West.	1150	SK-60 & 63
15	10	West.	850	SK-70
14	15	West.	1150	SK-83
3	15	Reliance	1150	66-TF
2	15	West.	900	SK
1	20	G.E.	3500	CD
4	20	West.	1750	SK-83
2	20	West.	1150	SK-93
3	20	West.	900	SK-100L
5	25	West.	975	——
5	20	West.	1150	SK-103
2	25	West.	850	SK-120
1	25	West.	600	SK-130
3	55	West.	650	SK-121
3	125	Star	1150	——
1	165	G.E.	545	——

COAL CONVEYOR

1—Portable drag type 30′ long, 15″ wide, drag plates 14¼″ x 4″ driven by Wisconsin 4-cylinder V-type gasoline engine.

STORAGE BATTERY LOCOMOTIVE

1—4-ton Goodman 30″ to 36″ gauge, complete with Edison Batteries and charging set.

HOISTS

200 Room Hoist with ¼″ cable with AC or DC Motors.
Car Pullers—75—Car Pullers with ¼″ cable equipped with DC or AC motors, or can be operated by hand.
Winches—150 Winches—1½ Ton capacity with cable, hand operated or with DC or AC motors.

CONVEYORS

3—G-20 Goodman Shaker Conveyors each with a Goodman Duck Bill complete with motor equipment with 250 v. DC motors.

1—35 HP. single drum, double reduction Diamond Machine Co. Drum, 19″ dia. x 18″ F with ″ flanges. Hoist has friction clutch and brake with hand operating levers.

PUMPS—Equipped With AC or DC Motors

1—11 GPM 460 ft. head Worthington Oil Pump.
1—60 GPM 479 ft. head Gould Pump.
1—100 GPM 50 ft. head Dayton Dowd Pump.
1—130 GPM 50 ft. head Dayton Dowd Pump.
1—160 GPM 50 ft. head Dayton Dowd Pump.
1—195 GPM 200 ft. head National Transit Pump.
1—210 GPM 60 ft. head National Transit Pump.
1—220 GPM 231 ft. head 3½″ x 3″ Blackmer pump.
2—243 GPM 100 ft. head Dayton Dowd Pumps.
1—300 GPM 90 ft. head Dayton Dowd Pump.
2—300 GPM 20 ft. head Gardner-Denver Pumps.
3—378 GPM 44 ft. head Dayton Dowd.
1—450 GPM 104 ft. head Dayton Dowd Pump.
1—500 GPM Morris Machine Wks. 4″ suc., 4″ dis., 123 ft. head, 1760 rpm.
1—550 GPM 88 ft. head Dayton Dowd Pump.
3—750 GPM 70 ft. head Dayton Dowd Pumps.
1—4000 GPM 138 ft. head Ingersoll Rand Pump.

COMPRESSORS

2—315 CFM. Ingersoll Rand Portable, 100 lbs. pres., driven by 105 HP. Waukesha Oil Engines, 860 rpm.

AC and DC MONORAIL HOISTS—¼ to 3 Ton Capacity.

VARIABLE SPEED MOTORS—230 V. DC —from 1 to 165 HP.

AC MOTORS—from ½ to 150 HP. squirrel cage and slip ring.

2—30-Ton Vertical BLISS PRESSES.

3—RADIAL DRILLS.

WELDING SETS—200 to 500 amp. capacity.

NEW AC STARTERS—Across the line—½ to 60 HP.

NEW DC MAGNETIC STARTERS—1 HP. to 25 HP.

DUQUESNE ELECTRIC & MFG. CO., PITTSBURGH [6], PA.

Montrose — 5800

WESTINGHOUSE

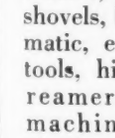
TYPE SK—MOTORS

WIRE INQUIRIES COLLECT

AMERICA'S LARGEST STOCK

NEW AND REBUILT

MOTORS • GENERATORS • TRANSFORMERS



BOUGHT and SOLD

ELECTRIC EQUIPMENT CO.
ROCHESTER 1, NEW YORK

SPECIAL OFFERING

Immediate Delivery

85—50-Ton, All-Steel, Twin HOPPER CARS. 1,880 Cu. Ft. Capacity. Cast Steel Side Frames and Bolsters.

Good Condition.

PHONE WIRE WRITE

IRON & STEEL PRODUCTS, INC.

42 years' experience

13484 S. Brainard Ave., Chicago 33, Illinois

"ANYTHING containing IRON or STEEL"

Locomotives, Shovels, Cranes, Crushers, Compressors, Hoists, Belt Conveyors, Screens, Feeders, etc.

A. J. O'NEILL

Lansdowne Theatre Bldg.

LANSDOWNE, PA.

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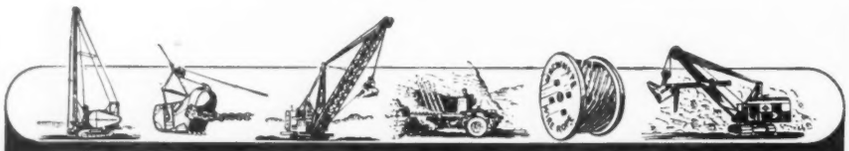

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New 230 v. DC Magnetic Cutler Hammer. Starters, 25, 40, 50, 60, 75 & 100 HP.

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HP	Make	Speed	WDG	Type
1400	West.	1200	Syn.	New 1 P.F.
1000	West.	1200	Syn.	New 8 P.F.
750	West.	1200	Syn.	New 7 P.F.
350	G. E.	900	S.R.	I-M
300	West.	1800	S.R.	CW
250	West.	277	S R.	CW 1314
225	West.	585	S.R.	MW
200	G. E.	240	S.R.	MT 412
200	West.	350	S.R.	CW
100	West.	1750	S.R.	C-I
100	G. E.	500	S.R.	M 1-25-cy.
75	G.E.	865	S.C.	I K
50	West.	580	S.R.	CW 658 D
50	G.E.	900	S.R.	I-M

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300 GPM 44' Hr. DeLaval 10 HP, 230 v. DC.
300 GPM 35' Hd. DeLaval 1½ HP, 230 v. DC.
150 GPM 53' Hd. DeLaval 5 HP, 230 v. DC.

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HP	Make	Speed	Wdg.	Type
1200KW	Al. Ch.	750	cpd.	500 v.
1500	West.	600	sh.	600 v.
200	Cr. Wh.	500	sh.	CM
175	G. E.	475	ser.	MD 109
130	G. E.	550	ser.	CO 1812
100	G.E.	480	ser.	MD 108
50	Northern	600	ser.	K
50	West.	565	cp.	SK 500 v.
50	West.	250/1000	sh.	SK
50	Reliance	1750	cp.	166 T
40	G.E. (Vert)	1750	cp.	CD 93
40	Roth	1500		
35	Cr. Wh.	700	sh.	CM
20	West.	750		
15	West.	850	cp.	SK 93
15	Wh.	800	sh.	CM
15 (4)	C. Wh.	1400/1700	sh.	CM
13	West. (Enc.)	825	cp.	SK 113
10 (2)	G.E.	1750	sh.	CD
7½	G.E.	1750	sh.	RL

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42"	5	1/8" — 1/16"
36"	6	1/8" — 1/16"
30"	6	1/8" — 1/16"
30"	5	1/8" — 1/16"
26"	5	1/8" — 1/32"
24"	5	1/8" — 1/32"

Width	Ply	Top-Bottom Covers
24"	4	1/8" — 1/32"
20"	5	1/8" — 1/32"
20"	4	1/8" — 1/32"
18"	4	1/8" — 1/32"
16"	4	1/8" — 1/32"
14"	4	1/16" — 1/32"
12"	4	1/16" — 1/32"

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16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

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"C" Width All Sizes —
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APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED

I.D. Size	Length	Per Length
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	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

AIR HOSE

I.D. Size	Length	per Length	Universal Couplings
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	50 "	10.00	1.50 Pair
¾"	25 "	7.50	1.50 Pair
	50 "	15.00	1.50 Pair
1"	25 "	10.00	1.50 Pair
	50 "	20.00	1.50 Pair

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I.D. Size	Length	per Length
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1"	25 "	6.25
	50 "	12.50
1¼"	25 "	7.50

I.D. Size	Length	per Length
	35 feet	$10.50
	40 "	12.00
	50 "	15.00
1½"	25 "	10.00
	35 "	14.00
	50 "	20.00

Each Length with Couplings Attached

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. . . Three and one-half million dollars in new and nearly new coal mining machinery and equipment

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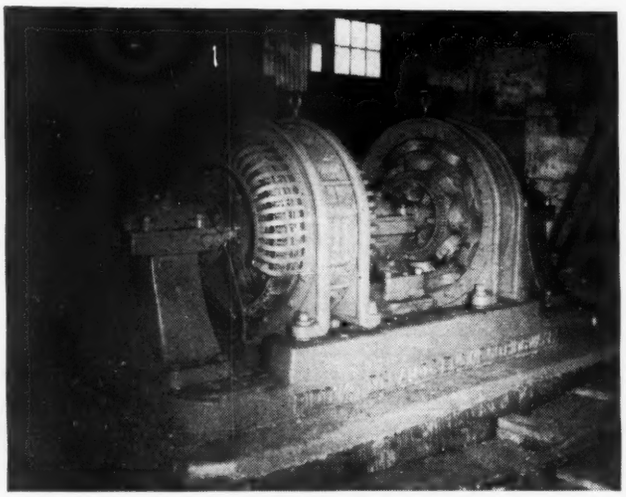
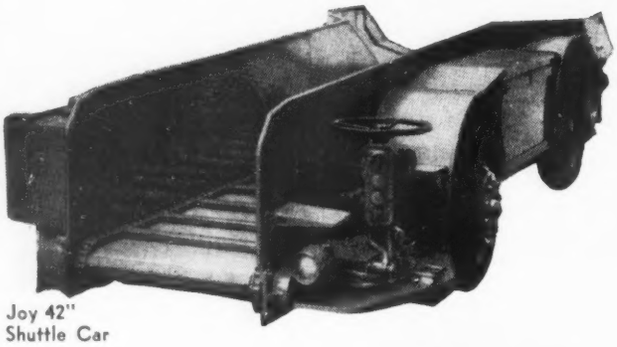
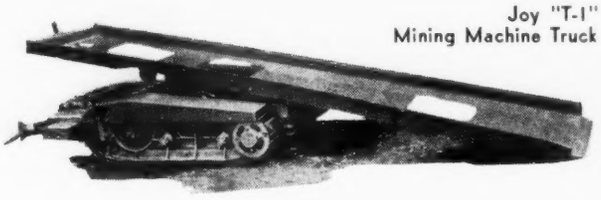


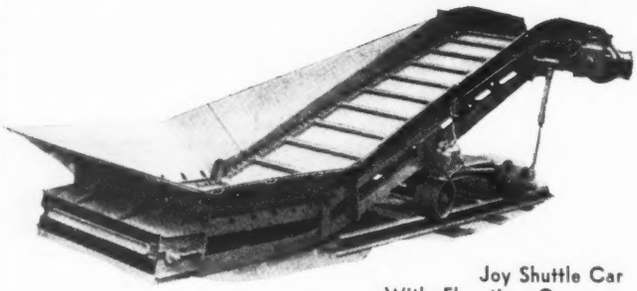
Motor-Generator Sets



Joy 42" Shuttle Car

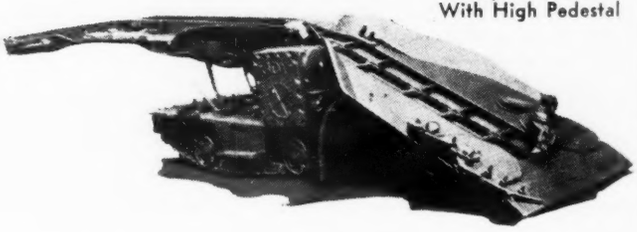
Joy "T-1" Mining Machine Truck





Joy Shuttle Car With Elevating Conveyor

Joy 7-BU Loader With High Pedestal



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Portland Equipment Co.
11 Broadway, New York 4, N. Y.

THE COLUMBINE MINE EQUIPMENT CO., INC.

1669 BROADWAY, DENVER, COLORADO

SEE PAGE 203 FOR APPROXIMATE SUMMARY OF HARD - TO - GET OFFERINGS

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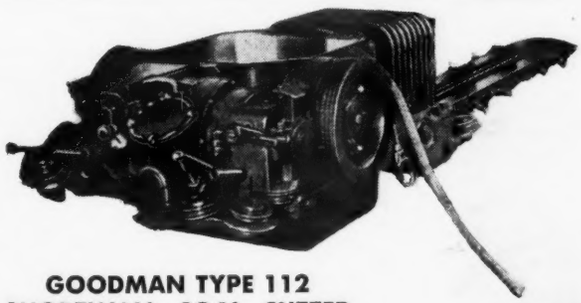
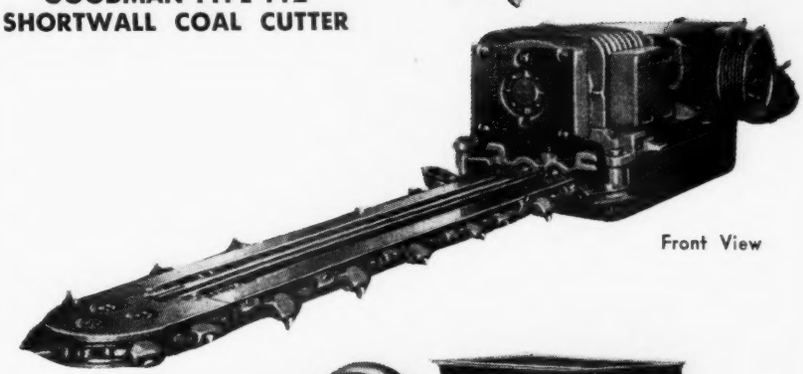
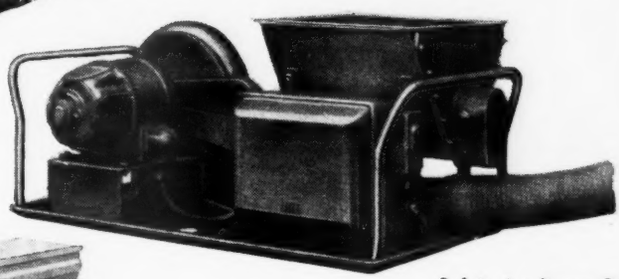


Rear View

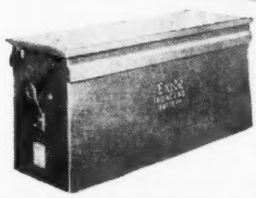
GOODMAN TYPE 112 SHORTWALL COAL CUTTER



Front View



Safety Appliance Co. Rock Duster



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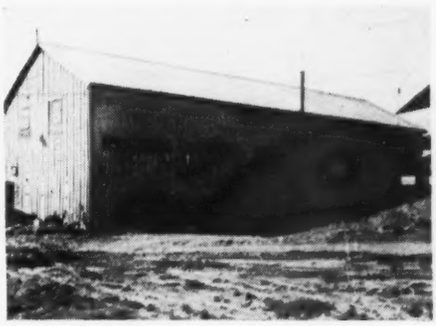

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In Business for Your Safety

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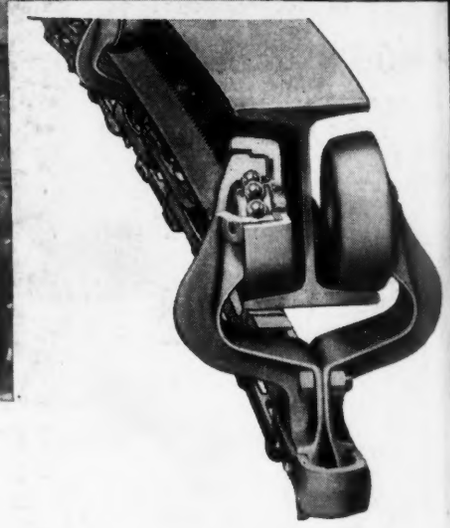
HELPS MINERS UP AND DOWN SLOPE



An Adaptation of a Standard Link-Belt Overhead Trolley Conveyor

The illustration shows an adaptation of the popular method used by ski resorts to assist skiers to the top of the run. Installed by Jones & Laughlin Steel Corp. for its coal miners at the company's Vesta-Shannopin Coal Division No. 5 mine in Washington County, Pa., the "skeetow" is a Link-Belt overhead trolley conveyor moving about 180 F.P.M. above a weather protected macadam path. Assisted by knotted ropes (or rods) hanging from the trolleys overhead, the men easily walk up a hillside to their parked cars or residences when they come out of the mine after a day's work. This type of conveyor is also being applied for assisting men up the slope from the mine bottom at other operations.

The idea for this "assist" to tired workers came from the president of J & L, after watching miners toil up a steep, rough path. The mechanical details were worked out by Link-Belt and the "skeetow" is available to other operators who have similar problems. Details available on request.

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